INDIAN FOOD INDUSTRY

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A PUBLICATION OF ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA)

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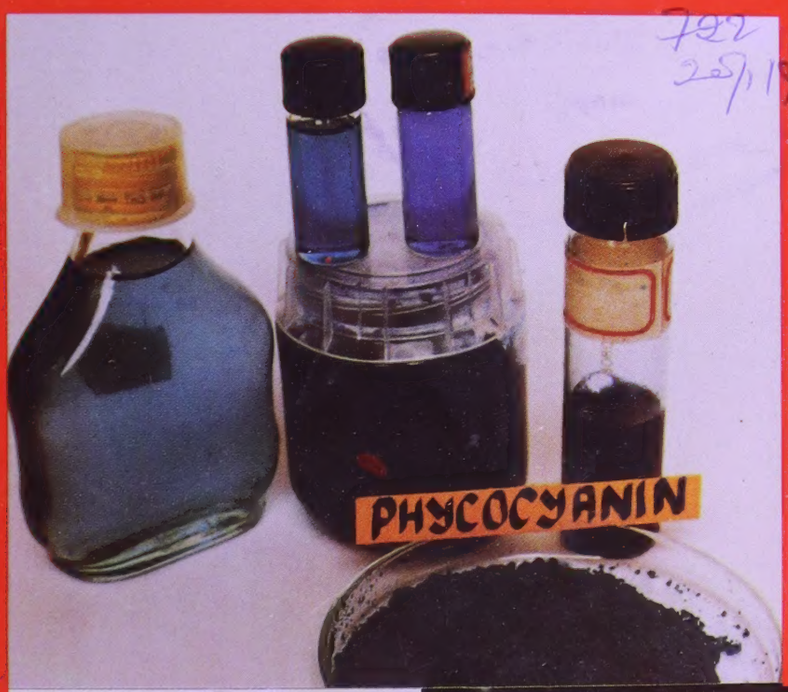

- Non-Permitted Colours in Eatables
- Role of Phosphates in Food Processing
- SO_2 Limits in Jaggery

ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA) MYSORE - 570 013

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* Affiliated to the Institute of Food Technologists, Chicago, Illinois, U.S.A.
* The Association is a professional and educational organization of Food Scientists and Technologists, with its headquarters at Mysore.
* The chapters of the Association the association are located at Bangalore, Bhopal, Bombay, Calcutta, Delhi, Hisar, Hyderabad, Jabalpur, Jaipur, Jammu, Kanpur, Karnal, Kharagpur, Ludhiana, Madras, Manipur, Nagpur, Pantnagar, Parbhani, Pune and Thiruvananthapuram.

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* Advancement of all the aspects of Science and Technology relating to production, processing and distribution of food, with the ultimate objective to serve humanity through better food.
* Promotion of research, development and training in the Science, Technology and Engineering of Food.
* To provide a forum for exchange, discussion and dissemination of knowledge and current developments, especially among Food Scientists and Technologists as well as the Public and Society at large.

Major activities :

* Publication of 'Journal of Food Science and Technology' (bi- monthly) and 'Indian Food Industry' (bi-monthly),
* Holding symposia/conventions on different aspects of Food Science, Technology and Engineering
* Arranging Lectures and Seminars for the benefit of Members and the Public.

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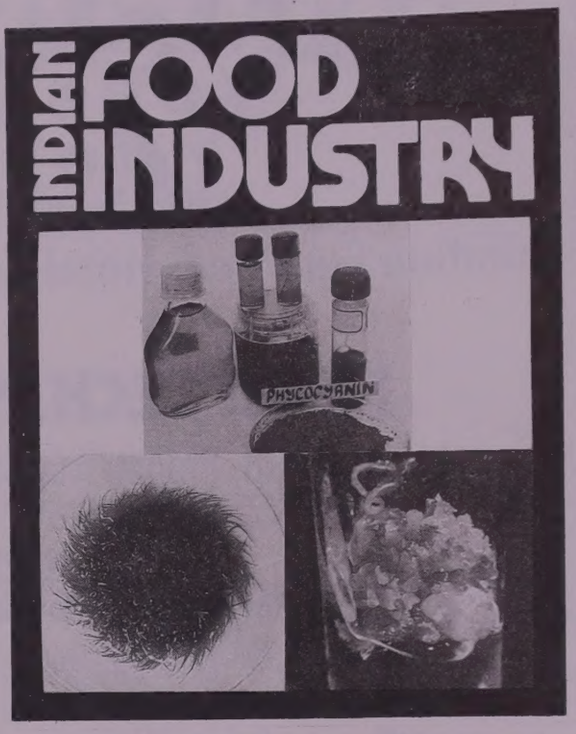

Cover :
Biotechnologically produced natural colours : (Top) Phycocyanin from cultured spirulina (*Spirulina platensis*), (Bottom left) Hairy root cultures of red beet (*Beta Vulgaris*), (Bottom right) Stigma proliferation from ovary of Saffron (*Crocus Sativus*)

Courtesy :
Dr. G.A. Ravishankar
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Review articles, technology papers based on R&D work and reports on various aspects concerning food industry are welcome from food scientists and technologists from industry, research institutions and other related organisations. Contributors are advised to provide good quality illustrations in the form of charts and photographs along with the manuscripts. The Editorial Board reserves the right to edit the manuscripts in order to make them suitable for publication in the journal, while assuming no responsibility for the statements and opinions expressed by the contributors, nor will they bind AFST(I) in any way. Readers are free to air their views through letters which may be published in the journal from time to time.

Food industries may send information (suitably illustrated with photographs) about their new products, machinery, business ventures and other developments, which will be published on the discretion of the Editorial Board.

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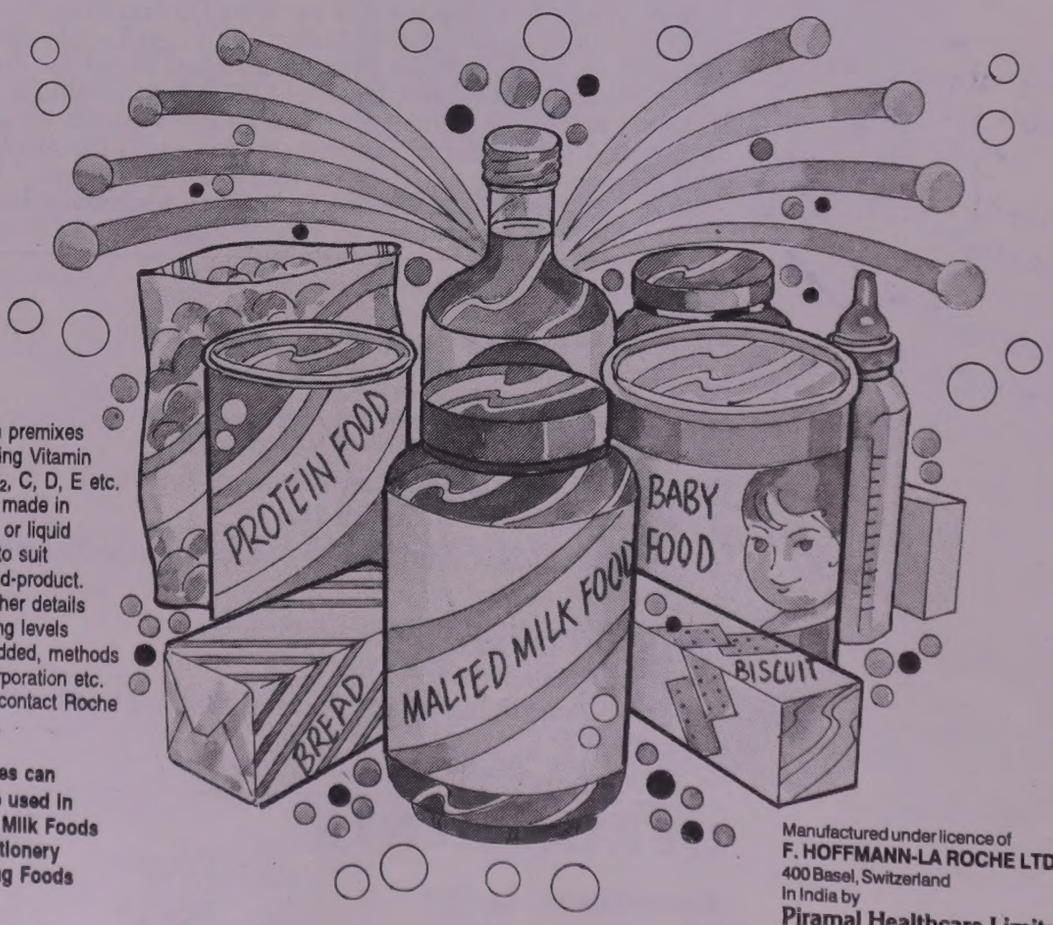

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FROM THE CHIEF EDITOR'S DESK

When somebody remarked that lipstick on a woman's lips looks like a bleeding wound, I strongly protested. I told the person that his perception is grossly perverted. For a majority of us, lipstick is attractive. Let us stop here, and not worry about the purpose in this case. Consider now an apple. It is attractively coloured with a purpose. I believe that it is the intention of the apple tree that you and I would bite the flesh of the fruit and spit out the seeds somewhere else for a new tree to come up. So is the case with mango or pomegranate - for dispersal of seeds. The flowers do it in a much more grand style to invite insects for pollination. Indeed, colour is an invitation. Colouring of food ought to have developed along the road of progress of human civilization and culture. But then, like in other areas, the weeds of aberration have cropped up here too, by indiscriminate and inconsiderate usage of colours in foods. While the synthetic coal tar - derived colours may be safe elsewhere (wood or wall paints, plastics, textiles etc.), in foods, not all synthetic colours are advisable. The food industry is well aware of this, more as a statutory regulation than anything else. But, what one needs to keep track of, is the scientific literature on colours that is constantly being generated. It is really not so much to think about compatibility of colours in food, but to be fully aware of the safety of their use. We shall not let the pendulum swing to the other extreme to accept all that is natural. In colours or in any other food additive, extracted from natural sources or produced synthetically, safety evaluation ought to be mandatory.

Richard Joseph

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INDUSTRY NEWS

AIC to Provide Data on All Agricultural Products

The USAID-funded Agribusiness Information Centre (AIC) project is to provide information on all agricultural products including commodities, rice and grains among others.

AIC is a joint project between the Federation of Indian Chambers of Commerce and Industry (FICCI) and Agriculture Commercialization Enterprises (ACE) supported by USAID to technically assist Indian agricultural companies.

The service would boost trade, as now trading was done on an one- to-one basis. Besides, the project plans to have tie-ups with the State Governments to expand to other States.

The tie-up with the State Governments would attempt to put up a State profile along with an agricultural product profile on the Internet.

State Governments have been requested to appoint an agricultural coordinator in every State, who would be in a position to provide information about the policy, regulations, agriculture environment, incentives, which the State provides as well as the future of the sector in the State.

Several State governments including Rajasthan, Karnataka and Tamil Nadu had already agreed to the proposal.

A Fresh Blow to Fertilizer Industry

The decision to raise the prices of petroleum products comes as a dampener for the fertilizer industry, more so for the nitrogenous and phosphatic segments. Naphtha too is now costing an additional Rs 2800 per tonne, which is 57 per cent more than the earlier ex-storage prices of Rs 4839 per tonne.

The additional bill for the fertilizer industry, for which napththa is the feedstock, will hit the phosphatic segment. The additional costs will neutralize the positive effects of additional subsidy on phosphatic fertilizers. The subsidies were raised from Rs 1000 a tonne to Rs 3000 a tonne earlier this year. Companies like Zuari Agro, SPIC, GSFC and Godavari will be particularly hit.

On the face of it, the additional bills do not seem to have damaged the nitrogenous fertilizers segment. This is because of the 12 per cent return assured according to the present fertilizer policy.

Even the urea segment will eventually be affected, though indirectly. This is because of the fact that though the subsidy is received from government to counter the rise, there exists a time lag between actual proceeds from the market and the subsidy received. By virtue of that, any additional costs to be recovered by way of subsidies will also take its own sweet time. Thus, producers will lose on account of their higher working capital requirements. This will neutralize the benefit of the rise in prices of urea effected earlier this year, which had bridged the gap between subsidies and the market prices.

Chocolate Prices Soar

Cocoa is one of the items whose international prices are on the upward move. The commodity, mainly used for chocolates, has been gaining over the months in future. It has touched a new high in the past nine years and rules now at around $1200 a tonne. The uptrend has been triggered off due to speculations of a possible crop failure due to dry weather around Ivory Coast.

With the prices of cocoa behaving in line with international trends, the two multinationals-Cadbury and Nestle, are on the defence. The two main consumers for cocoa in our country have to face the consequences in the current year.

Nestle's requirements have shot up considerably following the success of Kitkat and the launch of its chocolate-based health beverage. Cadbury too has been following a policy over the years to promote cocoa cultivation in some zones.

The availability of cocoa in the country is already well behind requirements, forcing both the consumers to opt for imports. In case the global trend for roofing cocoa prices/futures persists, profit margins are likely to shrink for both the multinationals. In fact, a clear trend was already evident for both these companies in the six months period of January to June this year. During this period, profits of both companies failed to pick up, despite growth in sales turnover.

Kochi to Have an International Tea Centre

Kochi could soon emerge as a centre of excellence in offering international blends of tea. Besides ensuring availability of teas for exports, this centre is also expected to develop value- added products for the global consumption.

Kochi is ideally located for building a centre of excellence in offering international blends. It was also proposed to set up a Tea Exchange, where teas from all origins could move in and out freely after value addition. Kochi is the best location owing to its strategic location and port facilities and this should be converted to advantage.

Hindustan Lever's Tea-chicory Mix to be Pounded out

A decision is expected in the near future over the tea-chicory mixture launched by Hindustan Lever Ltd. The issue had been referred to the Tea Board, which had asked the Central Food Technological Research Institute (CFTRI), Mysore to give its views on whether or not the product conformed to the norms of the Prevention of Food Adulteration Act (FPA). UPASI had urged HLL to withdraw the product on the grounds that it could open up the dykes to adulteration by others. The Consultative Committee of Plantation Associations (CCPA) had criticized HLL for coming out with the product and had argued that it should be sold as a new beverage altogether. The CCPA had said that the brand-name of Lipton Tiger could confuse tea drinkers, since the brand had first been used to sell tea.

World Bank's Package of Reforms for Indian Oilseed Sector

In a bid to rescue the Indian edible oil industry, victimized by supply-demand gap, the World Bank has conducted a study on the country's oilseeds sector.

Its report lists a strategy, which envisions a series of coordinated reforms to (i) liberalize oilseed exports; (ii) maintain unhindered imports of edible oil under current tariffs; (iii) remove the oilseed units from the purview of small-scale industry reservation and Essential Commodities Act; (iv) legalise access for oilseed products to futures market; (v) improve incentives-including government enforcement capacity for quality management and pollution control; (vi) improve market infrastructure to facilitate the flow of commodities and information both domestically and in external trade and (vii) strengthen capacity of the government to implement a complex reform process by establishing surveillance over trading in a decentralized economy.

The first set of reforms entails fine-tuning the external trade regime consistent with WTO rules by extending export and import liberalization to all oilseeds to deal with international price spikes. The recognition of intellectual property rights, to which India committed itself under the Uruguay Round of the GATT, would give seed companies incentives to sell improved seeds.

The second stage would require the industry to modernize domestic trade and processing policy environment by phasing out government interventions in operations of state cooperatives, establishing an agricultural price and trade surveillance unit, standardizing taxation of oilseeds and their products, etc. The report mentions that although regulatory changes can be rapid, implementation of such reforms and the gestation period is likely to take some time.

The third package of reforms, complements the second set of reforms but would require a still longer gestation period. It includes modernization of the market, post-harvest, transport and port infrastructure by decentralizing the financial and management authority of regulated markets, disseminating price information, establishing policy framework to promote private investment in market and developing grading facilities.

Scanty Rains May Thwart Oilseed Target

The Kharif oilseeds crop production appears to be a gamble in the hands of present monsoon season and traders say that the progress of the rains in the oilseed producing States is unsatisfactory. They fear that if nature fails the farmers, the Kharif oilseeds target of 125 lakh tonnes will be hard to achieve.

The major oilseeds producing States are Gujarat, Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu and Madhya Pradesh. Most of these States have received deficit rain so far for oilseeds crop. Gujarat, on the other hand, received heavy initial rains but is awaiting the second shower, which

is long overdue and is essential for the sown seeds.

Gujarat, which grows one third of the country's groundnut and also sesame and castor, received early first showers.

Groundnut Kharif estimate for the year is pegged at 57 lakh tonnes. Sesame seed target is fixed at 6 lakh tonnes, castorseed target at 7 lakh tonnes, sunflower at 4 lakh tonnes and soybean at 40 lakh tonnes.

According to a statement issued by the Soybean Processors Association of India (SOPA) about 80 per cent of sowing in Madhya Pradesh has been completed against the targeted area of coverage of 55 lakh hectares for the whole country. In the Southern oilseeds growing States, rains started around mid June but has been very scanty. According to sources, Andhra Pradesh has received about 150 mm of rain, while Karnataka and Tamil Nadu have received 150 mm in some areas and lesser than that in other areas. **When this item goes to the press, there are reports of heavy rainfall in the Southern parts of India.**

CFTRI to Certify Chicory Tea

Tea Board would send "Chicory" tea for testing to the Central Food Technological Research Institute (CFTRI), Mysore to find out, if the beverage adhered to Food Adulteration Act (FDA).

However, official sources said if the mixture adheres to FDA norms,nothing can stop the Hindustan Lever Limited (HLL) from promoting the 'Chicory' tea.

Asked about the FDA allowing mixing of 50 per cent chicory in coffee, the sources said the situation was different for tea and the Tea Board would go into that aspect.

Further, the Union commerce ministry has asked the Tea Board to look into the launching of 'Chicory' tea by HLL and submit a report to the government.

'Chicory' tea, being introduced by HLL under the brand name 'Tiger' comprises 70 percent tea, 20 per cent chicory and 10 per cent tapioca.

Industry sources said similar protests were raised, when chicory mixed coffee was launched. But, chicory has, in fact, helped increase consumption of coffee over the years.

Three years ago, when coffee prices had gone up, it was the chicory mix, which provided a cushion to the middle class coffee consumers. This year, tea prices were on the rise and the beverage, unlike coffee, had no alternative. Launching of the 'Chicory' tea could lead to large-scale adulteration and decrease in tea content in future. Besides, the launch comes at a time when the government is promoting consumption of pure tea.

SPIC to Float Ammonia, Urea Plant

SPIC, the fertilizer giant has decided to set up a new facility for the manufacture of ammonia and urea at its Tuticorin complex in Tamil Nadu at an investment of Rs 1,000 to Rs 1,200 crores. The new plant is expected to benefit from the existing infrastructure and an assured retention price for the fertilizers. The proposed ammonia plant will have a capacity of 4.5 lakh TPA and the urea plant would depend on the feedstock used. At present, the ammonia and urea capacities of SPIC are 3.52 and 5.12 lakh tonnes, respectively. Meanwhile, the company has started work on the $160 million ammonia urea plant at Jebel Ali Free Trade Zone in Dubai. SPIC has recently commissioned the $170 million plant in Jordan for producing 6.6 lakh tonnes of sulphuric acid and 2.24 lakh tonnes of phosphoric acid. These projects, along with the new plant at Tuticorin, will help SPIC emerge as a large fertilizer producer in the global market with a capacity of over 30 lakh tonnes in the near future.

Procurement of Foodgrains May be Decentralised

In a significant move, the Union government is planning to end the monopoly of the Food Corporation of India(FCI) and decentralize the procurement of paddy to begin with.

To be introduced initially in deficit or marginally surplus States of Uttar Pradesh, Madhya Pradesh, Bihar, Orissa and West Bengal, the new scheme is yet to receive the States's approval.

The States are expected to give their reply by the end of September, as the new scheme is slated to start in October, 1997. If the response to this scheme is encouraging, it can be extended to wheat with effect from April, 1998.

Under the new scheme, a designated agency in the mentioned deficit or marginally surplus States may procure, store and also issue foodgrains to the public distribution system (PDS) as per the Central government allotments.

The agency will be required to procure as much rice as may be required for that State's PDS. The surplus quantity, if any, will be transferred to FCI as per the Union government's specifications.

The State agency will be free to pay either the minimum support price (MSP) or a price higher than MSP to the farmers, but the Central government will pay the economic cost to the State agencies minus the central issue price (CIP).

This will not result in extra financial burden on the Central government, as the subsidy payable will be limited to what would have been otherwise payable to FCI.

The new system, if accepted, will eliminate the dependence on FCI for PDS supplies in the deficit and marginally surplus State. It is expected that this system will eliminate any complaints on quality, as the consuming States will be the custodians of the procurement.

Besides, availability will be ensured. Most significantly, the higher local procurement will reduce the rail freight to the deficit States, to the extent that subsidy borne by the Union government will also decline. The overall increase in the procurement for PDS distribution is likely to get a boost.

Currently, FCI handles the entire procurement, storage and distribution for the whole country. Foodgrains procurement is undertaken by the FCI in association with State government agencies such as the State Civil Supplies Corporation, State Marketing Federation and the State Warehousing Corporation etc.

NDDB to Launch *Dhal* Analogue

National Dairy Development Board (NDDB) is all set to launch its *dhal* analogue soon. The trial production is expected soon. The plant technology group is engaged in product development activities.

Dhal analogue is one of the major products developed by this group as a part of this process. After a decade of R&D efforts, a commercial process has been evolved to manufacture this analogue, based exclusively on low cost oilseed extractions and cereal starches. An application for a patent for the cooking of *dhal* analogue, which resembles *tur dhal* in all respects has been forwarded.

The objective behind this project is to augment the availability of proteins for human consumption in the country. NDDB decided to go in for a *dhal* analogue because the vegetarian population of India depends on *dhals* for their protein requirements. The indigenous production of pulses in the country has increased only marginally from 12.6 million tonnes in 1989 to 14.6 million tonnes.

The *dhal* analogue manufactured by NDDB is expected to be cheaper than *tur dhal* and it can cater to the needs of the lower income groups of the population. The higher nutrition of *dhal* analogue will be particularly useful to the consumers from the weaker section.

Bumper Soy Crop to Boost Exports

With prospects of good soybean crop, export of soymeal in the current financial year is expected to rise to three million tonnes.

During April to July, about 3.38 lakh tonnes were exported compared to 7.38 lakh tonnes in the corresponding period last year. However, the soybean processors association (SOPA) chairman, Mr Davish Jain, said that the soymeal exports in the following months would compensate for the dismal export performance till now. Exports during the November-March flush period is expected at 2.2 million tonnes as against 2.55 tonnes for the full 1996-97.

SOPA had fixed an export target of 2.7 million tonnes valued at Rs 2,300 crores for the current year as against 1996-97 soymeal export of 2.55 million tonnes valued at Rs 2,425 crores.

Mr Jain said that even though volume exported will be more, net realization is going to be more or less the same, since the world prices are under heavy pressure. Soymeal is currently ruling at $240 per tonne against earlier rate of $300.

Uniform National Retail Prices for Coca-Cola

Coca-Cola India announced uniform national minimum retail price for all its soft drinks.

The announcement has been made following the discussion between the company and all its franchise bottling partners.

As per the new structure, the minimum retail price of the 300 ml returnable glass bottles will now be Rs 8.00, the 500 ml Rs 12.00 and the one litre bottle at Rs 20.00. The minimum retail prices of its 1.5 litre PET and 330 ml cans would remain the same at Rs 38.00 and Rs 13.00 per unit, respectively.

The prices of all package sizes of Maaza and the fountain servings would also remain unchanged. Coca-Cola India is of the opinion that this rationalising of price structure would benefit consumers, as the same prices would be effective nationally. The company also maintains that this has been necessitated due to the recent two excise increases in succession.

Coffee Exports May Come Under Brand Equity Fund

Proposals for exports of coffee under the Indian Brand Equity Fund were welcome according to the commerce ministry's additional secretary, Mr D.P. Bagchi. He referred to the success achieved under the Brand Equity Fund in exporting the Nargis Tea Brand jointly developed and marketed by the industry. Reacting to a query, Mr Bagchi said that the research facilities of the commodity boards would be strengthened during the Ninth Plan.

The secretary of the Coffee Board, Mr Ashok David, elaborated on the schemes to boost production and domestic consumption during the Ninth Plan. Earlier, the Coffee Board member for small growers, Mr Bose-Mandana, had expressed doubts whether the target of three lakh tonnes by the end of the Ninth Plan could be achieved. He further said that during the period 1976 to 1981, the Government of India raised through export-duties a sum of Rs 600 crores, which the growers could have ploughed back into further developing their plantations.

India's Fish Net 5.1 m Tonnes

India is the world's sixth largest producer of fisheries with a catch totalling 5.1 million tonnes in 1996, up from 4.9 million tonnes in 1995, according to a Food and Agriculture Organization (FAO) report.

China continues to be the world's most important fish producer contributing 27.3 million tonnes to the world catch of 115.9 million tonnes for 1996. The world production has increased by nearly three million tonnes over last year's 113 million tonnes in 1995, which the FAO attributes primarily to the increase in China's production.

India and China maintained production levels of 70,000 and 80,000 tonnes, respectively, even as Thailand remained the world's top shrimp producer, despite a decline in catch. The world shrimp production in 1996 was around three million tonnes, but the FAO forecasts a decline in production in the first half of 1997, as the main shrimp culturing countries continue to battle with disease problems.

Peru, Chile, Japan and the US are among the top five fishing nations in the world. On the trade side, the overall shortage in shrimp supplies resulted in lower imports from Japan and US, with US imports decreasing for the second year in a row.

Market-Oriented Strategy by CSIR to Fight 'Gene War'

A top Indian scientist who forced the revocation of an US patent for turmeric is charting a new market-savvy agenda that includes the manufacture of medicines from 160 rare herbs for patenting and global marketing.

"Eighteen of our laboratories are working together to identify 160 potential plants and we have identified something like 20 different diseases", said Dr R. A. Mashelkar, Director-general of the Council for Scientific and Industrial Research (CSIR).

"Any time we discover something new, we go aggressively for a patent," he said in an interview. Dr Mashelkar said that the country's top laboratories were working on ambitious projects in an attempt to create wealth out of the country's biodiversity fortune. He said that the ambitious programme, called 'plant-based bioactives', included the identification of several leads, which come from plants, so that scientists could create molecules, which would be useful in fighting different diseases. "Then there is a major programme on collection, isolation, structure elucidation, activity testing and a whole range of things", he said.

Dr Mashelkar, an internationally acclaimed chemical engineer, has charted out radical, market-oriented plans for the CSIR to create wealth for the country out of what he describes as an "intellectual stockpile". He is credited with creating a new awareness of intellectual property rights and patents in the country, where slack patent laws have often given leeway to widespread copyright and patent violations.

A pharmaceutical firm Cadilla is set to market bio-enhancers developed by CSIR's regional research laboratory in Jammu, which have been granted US patents.

"When our researchers read Ayurveda, they found something called Trikuta, which had black pepper from this, they separated what is known as pepperine, which is demonstrated to enhancing the bioavailability of a drug" Dr Mashelkar said "If you require 10 tablets a day, you could do with five tablets. It would mean the reduced use of the drug for the same disease, and reduced toxicity", he said.

"This is a very interesting example where we have gone over the whole tradition of Ayurveda, drawn inspiration, done scientific research and taken patents", he added.

Dr Mashelkar said that India was bringing two new patent laws amid fears of rising 'pilferage'of valuable plant varieties from the country's biodiversity resources.

He said that the Union government would shortly enact the Biodiversity Conservation Act with tough regulatory measures against the commercial exploitation of Indian biodiversity. The cabinet has also given approval to the Plant Varieties Act, which sets down the varieties, which can be sold or used for research purposes.

Cashew Sector Earns Record Foreign Exchange

The foreign exchange earned by India through export of cashew kernels, cashewnut shell liquid and allied products during 1996- 1997 was Rs. 1.283.03 crores, an all time record for cashew exports in terms of value.

The exports in 1996-97 comprised 68,758 tonnes of cashew kernels valued at Rs.1,281.04 crores and 1,350 tonnes of cashewnut shell liquid and cardanol valued at Rs.1.99 crores.

During 1995-96, about 70,334 tonnes of cashew kernels valued at Rs. 1,240.50 crores and 760 tonnes of cashewnut shell liquid and cardanol valued at Rs. 1.45 crores were exported, according to the figures of the Cashew Export Promotion Council (CEPC).

Cashew was the third largest foreign exchange earner among agricultural products exported during 1996-97, rice being the first and coffee the second.

Import of raw cashewnuts during 1996-97 was only 1,92,285 tonnes valued at Rs. 640.58 crores against 2,22,819 tonnes valued at Rs. 760.08 crores during 1995-96.

The unit price realized for cashew kernels exported in 1996-97 was Rs. 186.31 per kg against Rs. 176.37 per kg in 1995-96. The unit price of raw cashewnuts imported during 1996-97 was Rs.33.31 per kg.

The target fixed by the Centre for export of cashew kernels and allied products was $374 millions. Though export earnings during 1996-97 was an all-time record in rupee terms, it was only for $362 millions against the target of $374 millions. Shortage of raw nut supply, both from indigenous and imported sources and the sluggish market prevailing the world over were the main reasons for not achieving the export target fixed by the Government.

The US, the Netherlands, Japan, the UK, Australia, the UAE, Singapore, Germany, Israel, Hong Kong and France were the major importers of Indian cashew kernels in 1996-97. Decline in exports were recorded in respect of Japan, Hong Kong, Chinese Taipei, Bahrain, Kuwait, Lebanon, Spain, Greece, Austria and Russia. In respect of Russia, the fall was significant. Exports to Russia declined to 546 tonnes in 1996-97 from 14,905 tonnes in 1995-96.

Once An Agricultural Pest - Now An Export Commodity!

The giant African snail hitherto considered a pest in agricultural farms is poised to become a permanent foreign exchange earner for the country in a significant way.

In contrast to its status in India, the snail *achatina felica* is considered a delicacy in the western countries especially France, where it is priced very high.

These snails being an alien species are causing considerable damage to the plant species and their exploitation from nature would not cause environmental problems. Besides, these snails can be picked up easily from nature and so harvest is no problem.

But being vulnerable to easy exploitation, their natural stock is feared to deplete very fast, which gave rise to the need to develop some culture system to ensure their supply on a permanent basis to sustain an export trade.

To meet this need, the Central Inland Capture Fisheries Research Institute (CICFRI), Barrackpore, has developed a technology for rearing these snails to marketable size at a very high rate of survival.

The snail, reared on kitchen refuse, attained a size upto 74 mm in length and 61.5 gm in weight in 150 days in terraria at a stocking density as high as 200 per metre square.

CICFRI technology is simple and easily adoptable at farmer level. The shrimp farms are prepared in especially designed structures like terraria, snail house and farms. They are fed with kitchen refuse comprising an assortment of vegetables like spinach, tomato, ash gourd and water melon.

Non-basmati Rice Exports Hit by Baht Devaluation

Devaluation of the Thai baht has hit exports of Indian non- basmati rice badly during the first quarter of the current fiscal year.

Non-basmati rice exports from the country have declined by

40 to 50 per cent during the first quarter mainly since the Indian commodity has lost its competitiveness on account of a strong rupee and devaluation of the Thai baht, according to Agricultural and Processed Food Export Development Agency (APEDA) Assistant Director N.R. Seshadri.

While the Indian rupee had ruled strong until the beginning of August before depreciating by 2.5 per cent against the US dollar, all south-east Asian currencies, mainly the Thai baht, had crashed to their lowest-ever position against the dollar. But, there are more than one reason for the fall in non-basmati exports, though the stronger rupee had, in one way or the other, hit the shipments.

WTO Can Help Indian Dairies Milk Export Market

Indian dairy exports will have a distinct competitive edge over the developed countries under the World Trade Organisation (WTO) regime, as the rich nations will be compelled to reduce subsidies, which will make their products costlier, the National Dairy Development Board (NDDB) says in its annual report.

Stating that among the measures being put into effect by the industrialised countries are different forms of non-tariff trade barriers against the exports, the NDDB has asked the government to be aware of these threats and prepare to meet them.

The WTO accepts the standards, guidelines and recommendations formulated by the Codex Alimentarius Commission as the basis for sanitary and phyto-sanitary standards used in trade.

"The WTO agreement on sanitary and phyto-sanitary measures can, therefore, become a non-tariff barrier", the report says.

The commission and associated bodies are dominated by the developed nations, the Board says and adds "if our government is not vigilant, the standards, guidelines and recommendations could well be formulated in ways that become significant non-tariff barriers to our exports of dairy products". The draft Codex Standards for the manufacture of cheese restricts the raw material to cow milk, discriminating against buffalo milk, the Board explains.

NDDB says that the Codex Committee for milk and milk products has recommended a draft code on hygienic practices for the manufacture of uncured cheeses, even though it clearly discriminates against systems of milk production in the developing world.

The annual report also refers the need of speedy enactment of Multi-state Cooperative Societies Act for opening new doors for the cooperative movement in the country and meet the new challenges, which may emerge in future due to WTO regime.

Foreign Liquor Brands Bullish on India

For the complex, but growing liquor market in India, the just launched brands as diverse as Early Times and Teacher's 50 are genuinely upmarket stuff. These exclusively foreign brands look upon a market, which is ridden with 'ruthless' excise rules, inconsistent demand-supply and the ultimate prohibitions.

While the former, the world's leading Bourbon whisky brand, is being launched for mass consumption, the latter, a top-end premium brand, is going for a limited edition. Despite all excise bottlenecks, Mumbai still remains a favourite launch pad for these 'phoren invaders'.

"Indian liquor market owes a resemblance to its Brazilian counterpart", says Mr Jim Barr, brand ambassador of the Teacher's brand. Like the Latin American market, which was void in the late sixties and had grown into a matured market of 2,30,000 cases per annum, India is swiftly growing with the Scotch sector alone accounting for 6 percentage augmentation. The leading Scotch brand in India, Teacher's is claimed to be going great guns with a 35 per cent market share, which amounts to 23,000 cases a year.

"The share of whisky in the Indian liquor market is 70 per cent, which is divided primarily in the Indian Made Foreign Liquor and Scotch segments", says Amrit Kiran Singh South Asian Director of Jagatjit Brown Forman, which has brought Bourbon whisky to India.

Nestle's Import of Chocolates May Flood the Indian Market

Nestle India Limited, the Delhi-based foods major, has taken advantage of the new import policy announced by the Finance minister and imported two containers of premium chocolate brands-Quality Street and After Eight-from its international brand basket.

These are the first brands of chocolate to be imported after the latest Exim Policy freed imports of chocolates among other items in the food processing industry. Industry watchers say that the launch of these chocolates will open the floodgates in the Rs 1,100 crore confectionery market. There are a number of Swiss, American

and Italian chocolate manufacturers eyeing the country hungrily, they said.

Among the international brands waiting in the wings are Hershey's Mars and Ferrero Roche d'Or. Analysts also opine that this would open up the market for niche, premium chocolate brands.

"The two new brands will definitely give Cadbury's, which has about 60 per cent of the chocolate market, a run for its money", said an analyst.

While the brands have already been put on retail shelves in Delhi, consumers in Mumbai are yet to taste them. Company officials confirmed the same but refused to give any more details. While the Quality Street famous purple and white tin is available for Rs 175, the price for the After Eight mints could not be confirmed.

Retailers in Mumbai said that while they had been approached by some of Nestle's stockists informing them of the products, they were to yet receive any consignment. However, they added that it would be made available very soon.

Informed sources said that the launch in the two metros was a kind of a test launch. Depending upon the response it receives, the chocolates will be launched in the other cities. While currently, the company has no plans of manufacture the products locally, it will seriously consider this option after gauging demand. Nestle is also planning a mega launch for the two brands later.

Consolidated Coffee Unit Gets ISO 9002

Kushalnagar Works, a unit of Consolidated Coffee Limited, has become the first coffee curing establishment in India to receive ISO 9002 certification from Bureau Veritas Quality International. This certificate covers the entire ambit of its curing operations.

The unit is the largest coffee curing establishment in the country catering to a large cross section of the planting community and exporters.

Agricultural Growth Fixed at 2.5 pc and GDP at 6.5 pc

The agricultural growth rate for 1997-98 has been targetted at 2.5 per cent. In fact, the mid-year review (April-September 1997) of the annual plan pegs agricultural growth at 4 per cent.

While farm sector growth rate has been revised upwards, the gross domestic product (GDP) is now estimated to be 6.5 per cent instead of 7 per cent. The Ninth Plan targetted agricultural growth at 4.5 per cent and the agriculture ministry is optimistic of achieving that rate.

Agriculture ministry officials said that it is still early to predict the growth rate for the agricultural year which is calculated from July 1997 to June 1998. So far, paddy has registered a growth rate of just over two per cent and kharif rice production for 1997-98 is pegged at 73 million tonnes, 1.6 million tonnes over the last season. But the other crops have yet to be accounted for. Total foodgrain production for 1996-97 is estimated to be a record 198 million tonnes.

The review shows that agriculture sector as a whole has performed well. Wheat procurement, though off to a slow start ended at 9.3 million tonnes as of June 30, taking total wheat production to 68 million tonnes. Wheat production for 1997-98 too, is expected to exceed target by one million tonnes.

While coarse grains have registered an overall projected growth of 3.5 per cent, there is a shortfall of five million tonnes in the production of jowar and bajra. However, this has been off- set by a remarkable increase in milk, horticulture and fish production.

The review based on the planing Commission assessment indicates that the economy will continue to grow at under seven per cent during 1998-99.

Technology Mission for Livestock Proposed

A technology mission for live stock development has been proposed by the agriculture minister, Mr Chaturanan Mishra at the Parliamentary Consultative Committee meeting. The mission will require Rs 550 crores during the Ninth Plan.

Highlighting the importance of the animal husbandary and dairying sector for the national economy, Mr Mishra said in 1995-96, the sector output was pegged at Rs 827 billions which is 26 per cent of the total value of agricultural sector and 7 per cent of GDP.

A legislation to control the movement of livestock between States to effectively control spread of diseases is also under consideration, Mr Mishra said.

The new mission will focus on accessing and improving livestock potential in backward areas, increasing genetic potential consistent with the environment, improve animal health and disease control and strengthen cooperatives. The 16th livestock census, the final one for this century was also launched. The census provides comprehensive data on cattle,

buffalo, yak, mithun,goat, pig, sheep, camel and mules.

Agricultural Exports Too May be Liberalised

The Union government is planning to come up with a long-term policy on export of agricultural commodities. The policy will seek to totally free exports of rice, wheat products, pulses and cotton yarn, which are at present allowed for export only when the government gives permission for exports.

The proposal mooted by the commerce ministry is expected to be put up before the Union Cabinet soon.

The ministry is holding discussions with the various government departments related to this issue.

The ministry is said to have adopted this stand following a major shortfall in export of rice, wheat and oil meals this year. The policy has therefore, been conceived as a shift from the present regime of having *ad-hoc* export ceilings to free exports.

Rice exports during April-July 1997 amounted to only $265.49 million as against $332 million for the same period of last year. Wheat exports for the same period this year have been almost nil against $151.54 million last year.

Officials feel that not only will this help improve agri-exports from the country but it will also build a sizeable and regular export market from the country's agriproducts. The country was facing a problem in creating a market for these products because there was no continuity in export of these products at present.

The finance ministry too seems to be in favour of this proposal. The finance minister, Mr P. Chidambaram has for long been in favour of deregulating the over regulated sectors such as agriculture.

The finance minister has on many occasions described agriculture as the most over-regulated sector in the economy and said that it was plagued by lack of credit facilities, a ban on corporate sector involvement, restriction on movement of farm produce as well as absence of technology flow.

Mr Chidambaram has been seeking removal of all controls on agriculture for giving farmers the right to move, sell, export and determine the price of their produce.

Nepal's Dumping of Vanaspati -A Blow to Indian Producers

Nepalese manufacturers have started dumping vanaspati into the country, raising scare among domestic producers who are already operating on thin profit margins.

The move follows renewal of the Indo-Nepal trade treaty which became effective in January 1997. The Indian Vanaspati Producers'Association (IVPA) says the recent influx of vanaspati from Nepal would further erode the viability of domestic industry which is already on the verge of sickness.

Nepalese vanaspati make through the border states of Assam, Bihar and West Bengal, according to an estimate.

Trade sources say the product has acquired 20 per cent of market share in Assam, 40 per cent in North Bengal and 60 per cent in North Bihar.

Edible oils constitute 82 per cent of raw material used for making vanaspati. A factory in India is required to pay customs duty of 20 per cent on the import of edible oils.

Reports say Nepal has 18 vanaspati units each with a capacity of 25 tonnes per day. After its daily consumption of about 100 tonnes per day, the industry has 350 tonnes for dumping in eastern and northeastern states of India.

In Siliguri (assam), Nepalese vanaspati is available in 15 Kg containers. It is cheaper by Rs 32 to 35 per tin compared with Indian products.

Buffalo Milk Glut in Haryana

Milk production in Haryana has gone up by 240 per cent making percapita milk availability of 621 grammes per day in the state compared to the country's overall availability of 197 gms daily per person.

A spokeman of the Haryana animal husbandry department said that animal husbandry had been transformed into an industry in the State due to its pivotal place in the farm economy and its contribution in income generation in terms of livestock production like milk, eggs, meat and wool. Haryana had a livestock population of 9.8 million of which buffaloes constitute almost 50 per cent of the total. About 82 per cent of the total milk production is being contributed by the buffaloes alone.

Quality 'Murrah' buffaloes are being exported to other states from Haryana every year and were in great demand abroad also, he added.

A comprehensive plan to preserve and improve the fast depleting germplasm of the Murrah and top quality 'Hariana' buffaloes has been prepared through systematic and planned breeding under the national bull production programme. The Central government was providing 100 per cent financial assistance for the buffalo development programme in the State. A sum of Rs 14.60 lakh was received under this programme in 1996-97, of the Rs 11.5 crore to be spent during the Ninth Plan. The annual turnover of the poultry birds in the state was as high as 8.5 million.

The department had hi-tech and frozen semenfacility in 1,400 veterinary institutions and this facility was being extended to all its 2,217 veterinary institutions in the State. The department had also introduced the latest bio-techniques including establishment of an embryo transfer technology and bull karyotyping labs. A sum of Rs 1.89 crore was spent during the last financial year for the promotion of this technology.

To protect the livestock wealth from various contagious and non- contagious diseases the Haryana Veterinary Vaccine Institute at Hisar was producing 11 types of vaccines. The state has been provisionally declared free from rinderpest disease but a regular village search and sero-survelliance programme was going on in the state with the establishment of an 'Elisa' laboratory at Sonepat.

Amul's Big Foray into Mumbai's Ice Cream Palate

In less than nine months of its launch in Mumbai, Amul seems to have settled down to give the big daddy in the Rs 450-crore ice-cream market Kwality-Walls. A boost the new brand introduced by Gujarat Milk Marketing Federation Limited (GMMFL) with its low pricing and 'real milk, real ice-cream' strategy has already scooped up a market share of 21.40 per cent.

According to an industry analyst, "What Amul has not been able to achieve in chocolates, it has achieved in ice-creams. What is remarkable is the short period in which is has attained this figure".

Hindustan Lever Limited (HLL), with its Kwality-Walls brand, however, still has the lion's share of the market with 66.20 per cent. Amul seems to have made its mark by nibbling into market shares of the regional brands such as Pastonji, Dinshaw's and Joy.

The market share of Vadilal Dairy International, with its Vadilal and Dairy Fresh range of ice creams, on the other hand, has taken a beating, according to the same marketing audit conducted by Samsika Marketing Consutants. It now has a share of only 5.70 per cent in the city.

Kwality-Walls still maintains its number one position, primarily by virtue of being in the market for several years, and through brand acquisitions and extensions.

As for the most popular pack size, the cups account for almost 43 per cent of the total sales with cones bringing up the rear. Kwality-Walls sells 23 per cent of cups (from its 66 per cent market share), and about 21 per cent of cones. While Amulsells 16 per cent of its ice-creams in cups, its cones account for only 2 per cent of the sales.

Clean Chit by Government to Wheat Imports from Australia

The Government of India has said that it would not make any compromise with the statutory requirements in the present wheat imports from Australia, according to a government note.

Terming press reports of the wheat being inferior in quality as inaccurate, or based on insufficient information, the government note states that the technical requirements as per the Plants, Fruits and Seeds (PES)(regulation of import in to India) Order, 1989, in the imported wheat were met with regard to notified plant quarantine objects. A team of experts may be deputed to Australia to ensure smooth operations in future.

The stringent plant quarantine measures taken during the inspection of the imported wheat revealed the presence of weeds in the consignment. But, authorities are of the opinion that such weed seeds remain inevitable during the harvest of any crop produce.

Therefore their presence this time was not unusual. As a precautionary measure to prevent any kind of soil contamination, the Food Corporation of India (FCI) was advised that the imported wheat should not be moved to any of the major wheat-growing areas.

As India and Australia are signatories to the International Plant Protection Convention, 1951, due precautions have been taken by the STC in its provisions of the Convention by securing official a Phytosanitary Certificate for the wheat consignment.

VIEWS

Perils of Technology Transfer

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(We have opened a new column called 'VIEWS' to permit eminent consultants, academicians and policy-makers to air their views on matters of prime importance to the Indian Food Industry. It is hoped that this new feature will facilitate to set in motion the process of serious thinking, situation assessment and action planning among the concerned people. It could also serve as a forum for debate where diverse opinions and views are expressed. Towards these ends, the VIEWS column, which as of now will be on invitation, will allow freedom of expression, not necessarily congruent with the Journal's views -

Chief Editor)

Introduction

Manmohanomics of early nineties had seen globalisation and economic liberalisation in India with no holds on foreign investments and technology transfers. For a country with decades of protectionism for native technologies, subsidies and insulation against international competition and strait jacketed regulations, this has been a shocking change. Indian industries have reacted positively as evidenced by several hybrid names emerging in industrial sectors with internationally established giants in the field. India has opened up new possibilities and widened market and with unbelievable demand for consumer goods. The Indian industrial scenario had seen regrouping and restructuring of several industrial houses with take overs and mergers. The need for diversification from core activities of companies to give buoyancy has been felt acutely.

What Ails Industrialisation Process?

The last two years have seen a slump in the industrialisation process and the economy has not been vibrant as visualised. The inflow of foreign investments has been a trickle with a mere $2.6 billions comingon to India during 1996 as compared to $170 billions in China during the same period. This needs introspection and the major reasons are: want of basic infrastructure, clear policies of the government, unobtrusive bureaucracy and committed work force. It is to be mentioned that our liberalisation of economic policies came too late, when major foreign investments have already gone to other potential countries, particularly to China.

For a strong industrial base, good R&D is essential, which has been dismal with less than 0.5 GNP in this sector in India and very poor investments in private sector.

Though late, our government should stimulate transformation of industry from vicious to virtuous cycle. For a strong industrial base, good R&D is essential, which has been dismal with less than 0.5 GNP in this sector in India and very poor investments in private sector. The role of scientist in India has been rather fluid and undefined, unlike in developed countries. We continue on the never ending debate of priorities of basic or applied research, which are complementary. The interphase of scientific findings and technology transfers are wafer thin and there is a yawning gap between the scientific community and industries looking for technology transfers.

Current Scenario

I wish to venture my assessment of how scientists and industries view each other at a juncture, when they have to be working in unison. Generally, industries view Indian scientists to have a comfortable career, with job security (nothing wrong in that) and doesn't know the priorities and needs of industries. Our scientists seem to prefer soft fund-

ing from government agencies for R&D, where reports are the goal rather than technology components. The projects are open-ended with no fixed time frame and publications get priority, sometime with extravagant claims. Basic research data are not linked to application and scientists are not motivated to work as a team since they wish to keep their own identity and prefer to work in isolation. Industries think that scientists do not have communication skills in commercial terms, lack big thinking and bold decision.

The role of scientist in India has been rather fluid and undefined, unlike in developed countries.

Against this background, it will be only relevant to know the views of scientists on Indian industry. Our industrialists do not take pride in Indian achievements and have more faith in anything foreign, irrespective of many being obsolete. They approach Institutions without total commitment and faith. R&D costs are the front line victim of cost cutting exercise in industries and their plans are often tax-efficient rather than economy-efficient. Profit analysis gets priority over other technical complexities. Further credit due to scientists for developing technologies is rarely given, but treated as dispensable. Attempts to bring the two together to sort out the mental blocks and prejudices are too few and far between. When industries in USA, Japan and European countries benefit by giving contractual research to Universities and Research Institutions purely on commercial terms, why should this not be adopted in India?

Remedies

The requirements are quite demanding with priority on quality assurance to keep the competitive edge and to conform to IS-9000 certification standards. Focus should be on environmentally sustainable industrial develop-

Basic research data are not linked to application and scientists are not motivated to work as a team since they wish to keep their own identity and prefer to work in isolation.

Table 1 : Food Industry Potentials*

	Present (value in crores)	2005 AD
World food market	2,50,000	4,80,000
Value-added foods	80,000	2,25,000
Indian food processing		
Potential	***	1,40,000 **
Processed milk	***	36,000
Poultry	***	27,000
Packaged *atta*	***	15,000
Bakery	***	10,000
Microbial-based	***	39,000
Loss by inefficiency		
Wastage and value loss	50,000	

* McKinsey & Company & CII Report 1997

** Investment needed; Food industry multiplier effect 2.4

*** Present market data not available

ment with emphasis on safety regulations. Pollution control measures and bio-friendly technologies are the need of the hour. Indian Industries in general and R&D scientists in particular should pay much attention on protecting the intellectual property rights (IPR) and not do much less patenting with no clear policy and support from the government, to prevent great vulnerability on the technical database generated in India and exploitation by the more previleged countries. This is very real now with information explosion and easy access to internet communication links.

Conclusion

In spite of this rather disturbing scenario, it will be relevant to point out that food industry in India has enormous potential. This has been elegantly brought out by the McKinsey & Company and confederation of Indian Industry Report of 1997 which was presented recently (Indian Food Industry May/June 1997) Vol 16(3). The world food market, which is presently Rs.2,50,000 crores, is expected to grow to Rs.4,80,000 crores by 2005 AD and growth of value- added foods will account for Rs.2,25,000 crores from Rs. 80,000 crores during the same period. The potential of Indian Agricultural productivity and food processing is computed to reach Rs.1,40,000 crores, provided, proper planning, coordination and technology transfers and investments take place. It is shocking that loss of food in India by inefficiency in handling and storage, wastage and value loss presently is put at Rs.50,000 crores. Is it not time for scientists and industries to work together with greater understanding to achieve self sufficiency atleast in food sector? The returns in food industries are more lucrative with a multiplier effect of 2.4 compared to any other industry. Will there be a greater introspection for a sustainable future? Opportunity lost can never be made up as we enter the twenty first century. Table 1 gives the data on Food Industry potentials.

The potential of Indian Agricultural productivity and food processing is computed to reach Rs.1,40,000 crores, provided, proper planning, coordination and technology transfers and investments take place.

Surveillance ..... continued from page 31

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FEATURE ARTICLES

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Biocolours : New Generation Additives for Food

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Introduction

The colour of foodstuff is one of the most important elements in determining its acceptance and enhancing delicacy of the food articles. The consumer expects to see his/her food looking 'natural'; a 'natural' appearance is appetising and enticing too. The association of colour and acceptance of foods is universal, although there may be significant variations, depending on geographical, ethical, historical and social factors and habits as well. Colour of a food is not only 'label' flavour type, but it also provides information on quality and condition. In many food systems, colour acts as an indicator of condition, particularly microbiological quality.

Colouring of foods has been an age-old practice, since the invention of synthetic colourants and petrochemical- based synthetic colours has found widespread acceptability due to their good stability and colouring ability. Now, because of consumer awareness and concern for healthful and perfectly balanced food, now-a-days people have developed an increasing interest for food colourants of natural origin. Natural colours are generally extracted from fruits, vegetables, seeds, roots and microorganisms and they are often called "biocolours" due to their biological origin. This article deals with different types of biocolours, their physico-chemical properties and application in different foods.

Benefits of Added Colourings in Foods

Several benefits are derived as a result of colourant addition in the food supplements, apart from enhancing the culinary status of the food item and these are as follows:-

The main groups of natural colouring substances in food are carotenoids, anthocyanins, porphyrins and chlorophylls.

(i) Improved appearance, flavour and enjoyment of food. (ii) Better information to the consumer of the characteristics of the food, particularly its flavour and condition. (iii) Some indication for how much to use and how long to store. (iv) Reduced cost and improved quality through manufacturer benefits and (v) Improved stability and reduced wastage in storage.

In general, a food colourant should fulfil the following criteria:

(a) Composition should be known and reproducible. (b) Safety should be established to agreed standards. (c) Should have high tinctorial power and can be used at low levels and (d) Should be chemically stable in the food products in which they are used.

The algae and plants being repertoire of various pigments became a centre of attraction for food technologists to search for colouring agents to be used in food system. In fact, at present, algae, bacteria and plants are the three important sources of biocolours. Commonly available commercial natural colourants of plants origin are carotenoids (extracted from citrus peel/pulp), oleoresin (extracted from red capsicum), annatto (extracted from *Bixa orellana*), carrot extracts, chlorophylls and heterocyclic pigments like flavones and anthocyanins-oenocyanin and betanin. Out of the commonly available natural colours, very few are in use for confectionery (like annatto, caramel, beta-carotene, cochineal, chlorophyll, saffron and riboflavin), whereas inorganic colourants are limited to silver and aluminium under strict conditions and for external colouring only. There are only 8 permitted synthetic colours for confectionery

namely, Carmosine, Indigo carmine, Brilliant Blue-FCF, Fastgreen-FCF, Erythrosine, Ponceau-4R, Sunset yellow-FCF and Tartrazine. Common plants, whose extracts are reported to have some role as natural food colourants, are curcuma root, citrus oils, gardenia, saffron, carrots, paprika, hibiscus, elderberries, beetroot, purple corn, sandalwood, nettle and spinach.

Carotenoids

The main groups of natural colouring substances in food are carotenoids, anthocyanins, porphyrins and chlorophylls. Carotenoids are responsible for many of the brilliant red, orange and yellow colours of edible fruits, vegetables and mushrooms.

Carotenoids occur very widely in nature and their annual natural production is the highest among all other natural colours. The first synthetic carotenoid to be marketed in 1954 was β-carotene. Other carotenoids, which have since become commercially available for food colouring, are reported to be β-apocarotenal and canthaxanthin. Natural extracts containing carotenoids have been used as the main colouring component; saffron with crocetin and other carotenoids (both bixin and crocetin are diterpenoid carotenoids); paprika containing the two pigments, capsanthin and capsorubin; xanthophyll extracts from leaves; carrot extracts of varying purities and red palm oil. Carrot extracts and red palm oil have been widely used as colouring agents, mainly to colour fats and margarine.

Physico-chemical Properties

Pure carotenoids have poor stability and low solubility (Counsell, 1980). At different concentrations, carotenoids give yellow-orange-red shades. They are very sensitive to oxidation and hence are stored under inert gas or in vacuum. Oxidation of carotenoids is accelerated by light and in the presence of oils as a primary oxidising substrate by metal catalysts, particularly copper, manganese and iron. Carotenoids are completely insoluble in aqueous media and sparingly soluble in oils. Many carotenoids are also precursors of vitamin A. According to the Swiss Food Regulations, the provitamin A activity of β-carotene is admitted to be 1.667 million IU vitamin A per gram only, if β-carotene is present in an oily solution. In foods, tocopherols and vitamin C and their fatty acid esters stabilize carotenoids (Bavernfeind *et al.*, 1962).

The very slow rate of dissolution of the crystalline pigment is a considerable disadvantage, when β-carotene is added to fat-based foods on an industrial scale.

The very slow rate of dissolution of the crystalline pigment is a considerable disadvantage, when β-carotene is added to fat-based foods on an industrial scale. Solubility of carotenoids can be increased by reducing their crystal size. In many cases, less concentrated suspension of carotenoids has a tendency to settle and agglomerate. This can be prevented by dissolving stearic acid in the suspension followed by cooling and thereby forming a thixotrophic system with a reversible gel structure (US patent). Tocopheramines have strong stabilising effect in foodstuffs, containing carotenoids and moreover, they have a remarkable vitamin E activity (NL patent). Generally, marketable forms of carotenoids are suitable for colouring oils and fats. However, most carotenoids exist in nature in very fine dispersion and in this state, are capable of colouring aqueous media such as the juices of oranges, tomatoes and carrots. Now-a-days, most of the carotenoid-based yellow colouring agents are obtained by mixing citrus fruit extracts, curcuma, paprika or saffron with a carrier material such as cellulose, starch, pectin, gelatin, suspending them in water followed by drying.

Solvents, which dissolve relatively large amounts of carotenoids, include orange oil, diterpene esters, e.g., abietic acid esters and other derivatives, acetylated parkal fatty acid glycerides, aromatic aldehydes and aromatic alcohols or their derivatives. Particularly interesting solvents are vitamin A and vitamin E. But, the strong and specific odour of orange oil and most of the aromatic solvents restrict the field of application of such products. Amongst these, abietic acid ester proved to be stable for wider applications (Terasaki *et al.*, 1964).

Water-soluble powders of β-carotene and β-apo-8'-carotenal developed by Hoffmann-La Roche and Co. AG, Basel, Switzerland, contain 10% of pure active substance. Depending on the concentration, β-carotene gives a yellow to reddish orange solution, while apocarotenal gives a yellowish red solution. Water-soluble carotenoid products may be used alone or in combination with sodium phosphate derivative of riboflavin. But, relatively low light stability of riboflavin, however, tends to restrict the possible application of such combinations.

Applications in Food

Synthetic β-carotene was first chosen for colouring margarine and butter because of its solubility. Suspensions in vegetable oil containing 20 to 30 per cent micronised β-carotene are the most suitable formulations for

colouring margarine, oils and fats. These forms are also well suited to colouring fillings in cakes, chocolate fillings, fat in instant soup powders, sandwich spreads and tartar sauce. The amount required to be added depends on the colour shade desired, but generally lies in the range of 3-6 g pure β-carotene per tonne. Butter may be coloured with β-carotene in both batch and continuous churning method (Parman, 1964). It is the ideal colour for most of the dairy products and 10% water-soluble β-carotene is preferred in this regard (Klavi,1981).

β-carotene and β-apo-8'-carotenal have also been considered as colours for both natural and processed cheese (Bavernfeind and Bunnell, 1962). The amounts of pure carotenoids ranged from 4 to 12 mg/lb cheese. In the production of processed cheese, cheese spreads and cheese sauces, a 20% apocarotenal suspension in vegetable oil is used for direct addition to the melted cheese batch. However, during fermentation process of yoghurt making, not many colouring substances added remain unchanged, but carotenoids have proved to be stable in yoghurt. In future application,10% water-solube carotenoids will be particularly suitable for colouring ice-cream, but the length of time and temperature used in the preparation of the ice cream should be sufficient to allow the beadlets to dissolve fully. However, carotenoids do not cover the whole range of hues commonly used in ice creams today. Filled milk, a product usually made from skim milk with a non-dairy fat, if desired,may, easily be coloured with β-carotene (20% suspension in vegetable oil). The amount of carotenoids, which can be incorporated into gelatin desserts, is limited because the carotenoid preparations can produce an undesirable clouding at higher doses (Bunnell and Borenstein, 1967). Fruit preserves and syrups may be coloured by carotenoids, but a cloud will be produced. Water-soluble forms of carotenoids are fit for colouring of sugar confectioneries like candies, toppings, icings, fruit gums, fruit drops etc.

Suspensions in vegetable oil containing 20 to 30 per cent micronised β-carotene are the most suitable formulations for colouring margarine, oils and fats.

Water-soluble β-carotene preparations have been used successfully in producing well-coloured macaroni products from pale coloured semolina. β-carotene shows good stability in these products. Egg yolks are normally coloured naturally by feeding chickens with rations rich in pigmenting carotenoids. An aqueous dispersion of carotenoids in large amounts of dextrins or sugars can be applied to colour breakfast cereals and dried infant food preparations. Popcorn, popcorn oil and cocktail savouries can be coloured successfully with carotenoids.

Among the commercial carotenoids, canthaxanthin is perhaps the best suited for colouring meat products.

Canthaxanthin

Canthaxanthin is a non-provitamin A carotenoid of algal and plant origin. It provides red hue to the food. It has good light stability as compared with paprika and at room temperature, it has got good stability and hence is commonly used for salad dressing.

Among the commercial carotenoids, canthaxanthin is perhaps the best suited for colouring meat products. It has promising potential for colouring meat substitutes, e.g., products based on soy or other cereal proteins, single cell proteins or fish proteins. Fat percentages in these foods play an important role in imparting a shade and distribution of colour. Canthaxanthin is suitable for colouring of shrimps and lobster products (especially peeled, canned or deep-frozen shrimps). In shrimps, canthaxanthin is preferentially deposited along the rings, as they are richer in fat. It has been successfully used as an oral skin colouring agent and is also used as a research tool in the investigation of biological effect of carotenoids (Mayne and Parker, 1988).

Riboflavin

Riboflavin is one of premier cadres in the vitamin B groups. It is commonly found in milk, leafy vegetables, meat and fish. Best dietary sources of this vitamin are milk, eggs, kidney, heart, liver and leafy vegetables. Lesser sources include beef, veal, poultry and various fruits, notably apricot and tomato, whereas low levels are found in fish, cereal grains and legumes.

Structure

It is a derivative of isoalloxazine with a ribitol side chain. It is consequently amphoteric. Substitution at position 5 of the ribose group to yield the phosphate ester results in the formation of the commercially important derivative, riboflavin-5'- phosphate sodium.

Table 1 : Possible Applications of Certain Biocolours in Food

Food	Shade	Biocolours	Addition level (%)
Hard candies	Pink	Beet root juice powder	0.1
	Rose Red	Anthocyanin powder	0.2
	Yellow	Riboflavin	0.01
	Pastle	Chlorophyll powder	0.002
Pectin	Violet	Anthocyanin powder	0.25
	Red	Canthaxanthin 10% WS	0.02
	Yellowish green	β-carotene 1% CWS	0.025
Gelatin	Raspberry Red	Beet root juices	0.2
Ice cream	Brown	Caramel	2.0-3.0
	Bluish green	Chlorophyll	0.1-0.5
	Pink	Caramine+	1.0
		Annatto	0.006
	Light cream	Annatto	0.01-0.05
	Yellow		
	Orange yellow	β-carotene	0.1-0.2
Pastry	Pale yellowish	Chlorophyll powder	0.0002
	White	β-carotene 1% CWS	0.05
Biscuit shell	Golden yellow	Chlorophyll powder+	0.006
		β-carotene	0.1
Cake	Chrome orange	Chlorophyll powder+	0.0055
		Dry canthaxanthin 10% WS	0.055
Biscuit cream	Mauve	Anthocyanin powder	0.01
	Brown	Beet root juice powder	1.6
		Canthaxanthin 10%WS	0.16
		Chlorophyll powder	0.052
Jams	Lemon curd	Riboflavin	0.01
	Strawberry	Anthocyanin+	0.006
		Canthaxanthin 10% WS	0.02
Jelly	Black currant	Anthocyanin powder	0.6
		Beet root juice powder	1.0

Properties

Riboflavin is slightly soluble in water (0.007%) at room temperature and virtually insoluble in ethanol, ether, chloroform and acetone, whereas riboflavin phosphate is considerably more soluble in water. It casts pure yellow shade when used in aqueous solutions. Riboflavin and riboflavin phosphate have characteristic bitter tastes and hence, its application in certain foods with low flavour level requiring high colouring intensity is discouraged. Neutral or acidic solutions of riboflavin are relatively stable to heat but show poor stability towards oxidation and sensitivity towards light. Application of riboflavin in different types of food is given in Table 1.

Annatto Colour

Annatto is a yellow oil or aqueous alkaline extract of fruit pulp of Raku or Orleans shrubs or brushwood (*Bixa orellana*). The major pigments of annatto are bixin (XVIII) and norbixin, which together produce dicarboxylic acids upon hydrolysis.

Origin

Annatto has originated from West Indies and the pigment has been isolated from the seed pulp of the tropical bush, *Bixa orellana*. Bixin is the monomethyl ester of norbixin, a dicarboxylic acid, homologous to ococetin. This colour is chiefly utilized as a food pigment to colour margarine, ice creams, various cheese products, beverages, sauces, meat, confectionery and bakery products.

Bixin, the pigment found in the natural colouring agent annatto, is unsuitable for use in fruit squashes, because it normally fades within the shelf-life of the squash. However, if it is used in conjunction with a wax-based clouding agent, the fading problem is markedly reduced. A preferred clouding agent is Robertet Cloudifier F/05875, which contains beeswax stabilized with natural gum and is used at the rate of 0.3-0.7% by wt. of the beverage. In addition, 3-7% by wt. of disintegrated solid fruit residue (e.g., comminuted citrus peels) also reduce fading of 0.1-1.00 ppm bixin.

Extraction

The extract of colour is made by boiling the annatto seed in the oil for several hours at 240^0F for the purpose of effecting a permanent solution of the annatto colouring principle in the oil, followed by filtration through heavy canvas, either by gravity or under pressure. The filtered oil constitutes the commercial butter colour. It is almost clear to the eye, but magnification would show the presence of very fine particles of suspended matter.

Betalaines

Betalaines are said to be the family of chemical substances, which include betacyanins and betaxanthins, which are the major pigments of red table beet (*Beta-vulgaris*). Betaxanthins are generally marketed in the form of beet root juice powder, which readily dissolves in water to give a clear solution, but is insoluble in fats and oils. It offers a bluish pink hue to the food and remains unchanged by alterations of pH, as it shows maximum stability at pH range of 4.0-5.0.

Phycocyanin is commonly used as a colourant for frozen confections, sherbet and sweets.

Phycocyanin

Phycocyanin is another colourant, which gives a blue hue and commonly extracted from *Spirulina* sp. (Benennann *et al.*,1987). It is a soluble agent having highest stability at pH 5-7 and its stability can be improved by addition of antioxidants such as sodium L-ascorbate and sodium erythorbate or (to a lesser extent) L-ascorbic and erythrobic acids. The antioxidants can be added to the concentrated or dried phycocyanin or to the food ingredients directly. Phycocyanin is commonly used as a colourant for frozen confections, sherbet and sweets. These days in Japan, blue chewing gum is prepared by the incorporation of phycocyanin or phyceryanine, extracted from *Spirulina* sp. which is also added in green beverages in Germany for stabilization of green colour, which remains significantly unchanged even after 5 hours heating to 80^0C or after 12 months storage at 25^0C (Wiesenberger *et al.*,1986).

Chlorophylls

Chlorophylls are defined as the green pigments present in organisms capable of photosynthesis and as such are an essential component of all green vegetation. The two major naturally occurring forms of chlorophyll (types a and b) are derivatives of porphyrin. It is commonly available as sodium copper chlorophyllin, which is freely soluble in water and offers a blue-green hue to the food, wherein it is used. Application of chlorophylls in food is indicated in Table 1.

Anthocyanins

Anthocyanins are not only found in a large number of fruits and vegetables, but also found in the petals of many red and blue flowers as well as in leaves of some plants. There are as good as six commonly occurring anthocyanins found in foods, namely, pelargonidin, cyanidin, peonidin, delphinidin, petunidin and malvidin.

Structure

Chemically, anthocyanins are flavonoids of the flavan type. They are substituted glycosides of salts of phenyl-2-benzopyrilium.

Physico-chemical Properties

Anthocyanin powder is soluble in water, producing clear solutions, colour of which is the dependent upon the pH of the medium. It is insoluble in fats and oils. Dry anthocyanin powder is normally a dark red, fine hygroscopic powder. It offers blue hue to the food at higher pH and its stability at this pH is extremely poor. Hence, foods having pH more than 4.2 should not be coloured with this material. Anthocyanin is oxygen- sensitive and undergoes oxidation, when exposed to air. The same is relatively unaffected by exposure to daylight. Prolonged heating, especially

Table 2. National and Multinational Farms Marketing Biocolours

Name and Address	Product
Synthetic Industrial Chemicals Ltd. Cochin, India	Xanthophyll and others
Cat Compack Foods Santa Ana, U.S.	Oleoresin carrot (water soluble and oil soluble)
Canandaigua concentrate	Grape red concentrate
Denisen Trading Co. Inc. Grafton, U.S.	Annatto, Paprika, Turmeric
Naturex Blauvelt, New York	Oleoresins(encapsulated) natural colours
Roche Products Pvt. Ltd. Frenchs Forest, Australia	Carotenoids
Roche Vitamins Fine Chemicals, Canada	Beta carotene
Meganatural colours, California	Powder, Liquid natural colours
Aromes De Brctagne-Diana, France	Natural colours
Meer-aculous North Bergen, New Jersey	Biocolours
Mears Trading Pvt.Ltd., Australia	Natural colours
Matarom (Australia) Pvt. Ltd., Australia	-do-
Universal Flavours (Australia) Pvt.Ltd. Australia	-do-
Chr. Hansen UK	-do-
J. Manheimer Inc. and Synthite, New York	Oleoresins
Kalsec Inc., UK	Natural colours
Hauser Food Ingredients, UK	Natural colours concentrate

when combined with exposure to oxygen or ascorbic acid, causes colour loss of anthocyanin. Presence of tannins in the naturally extracted product causes interaction problems, when other hydrocolloids are present. It is commonly a problem, where anthocyanins are used to colour gelatin-containing products. Recently, anthocyanins have been extracted from elderberry *(Sambucus nigra* L.), which has been considered to be a good source of anthocyanins, having 2 to 10 mg/g berry. Anthocyanin concentration is very much dependent on variety and maturity. This intense colouring agent can be used and stored in the form of freeze- dried powder. Its degradation rate is slow and half life is greater than five years. It has possible applications in low moisture food products (Bronnum-Hansen and Flink, 1985). Application of anthocyanin is given in Table 1.

Carthamin

Carthamin is commonly obtained from orange florets of dyer's saffron *(Carthamus tinctorius* L.). Carthamin bound to (adsorbed to) cellulose, collagen, cellulose derivative or other polymers, has potential as a red-colouring agent for some processed foods (Saito and Fukushima, 1991).

Monascus Pigment

Monascus pigments have etched its use in traditional oriental foods as a natural colouring agent. It is extracted from microorganism, *Monascus porporeus* grown on steamed rice by solid-state fermentation. Level of O_2 and CO_2 in the gaseous environment significantly influences pigment production by *M.purpuscus* (Ohantaek and Mudgett, 1992). However, *Monascus* pigment can be used for colouring banana sauce

and tocino (cured meat) at concentrations of 1.5% and 1.0%, respectively (Dizon and Sanchez, 1984). It can also be used as a colouring agent for meat products, such as ham and sausage. According to a Swiss Patent (1978), a colouring agent developed by reacting the yellow-red pigment of a microorganism of the *monascus* genes with a reagent selected from amino sugars, can be used to its best for imparting red colour to soy-based meat substitutes, yoghurts, aperitifs and non-alcoholic drinks. The reagent is preferably selected from chitosan, ethanolamine or hexosamine. Some of the national and multinational firms marketing biocolours are given in Table 2.

Conclusion

Use of natural colours in food systems seems promising. However, it has certain limitations, which needs proper attention. Most of the natural colours are costlier than the available synthetic colours. They exhibit a low tinctorial strength and get degraded with slight variation in environmental conditions. Above all, some of them show different colours at different pH ranges. None of the natural or nature-identical colourants presently available in market could completely replace synthetic dyes from technological and economic view points. However, disadvantages can be minimised by using suitable technology and quality assurance measures.

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Surveillance of Non-Permitted Food Colours in Eatables

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Introduction

Colours are used in food for centuries to increase consumer acceptability (Walford, 1980). Food colours constitute one of the major dietary additives. Colouration of fresh food products enables restoration of diminished attributes during processing and it further enables enhancing the aesthetic and physiological appeal to the consumer. However, because of cheapness, easy availability, several low cost food colours have tempted unscrupulous traders to use non-permitted food colours in various food products. A survey conducted at the Industrial Toxicology Research Centre, Lucknow during 1980-84 has clearly shown that about 70% coloured samples examined, contained non-permitted synthetic food colours. The study further revealed that the extent of adulteration in day- to day eatables was around 25%. Maximum adulteration of 40% was noted in non-dairy eatables, followed by 33% in milk, 15-16% in edible oils, ghee, butter and dairy products, 13% in cereals and pulses, 4% in hydrogenated vegetable oils and 19% in remaining samples (Khanna *et al*, 1985). Another survey of samples of sweets and confectionery products during festival seasons in 1993-94 in the twin cities of Hyderabad and Secunderabad by National Institute of Nutrition, Hyderabad confirmed wide usage of non-permitted colours. The major adulterants were metanil yellow, orange II and rhodamine B in sweets and confectionery products. These non-permitted colours were also detected in pulse and pulse products, tea, coffee and edible oils. As per the estimate of adulteration of non-permitted colours, it is observed that 5% of the samples contained orange II, 41% rhodamine B, 30% auramine and 24% samples had combination of rhodamine B and auramine (Anon, 1996). Therefore, it assumes greater significance for identification of food colours and its metabolites.

Synthetic colours are complex compounds of carbon, hydrogen, oxygen, nitrogen and sulphur.

Chemistry of Synthetic Colours

Synthetic colours are complex compounds of carbon, hydrogen, oxygen, nitrogen and sulphur. The manufacture of dyes proceeds from simple raw material mostly aromatic hydrocarbons such as benzene, toluene, xylene, naphthalene, acenaphthene, carbazole and anthracene with the introduction of other chemical groups such as nitro, amino, halogen and sulfonic acid. These intermediate compounds are further processed by many operations such as diazotization, coupling, condensation and fusion to give the final dyestuff (Anon, 1963).

Health Hazards of Non-Permitted Food Colours

Non-permitted food colours are used alone or in combination or mixed with permitted food colours in various food products such as *khoa*-based sweets, ice-creams, namkins, turmeric powder, chilli powder etc. The consumption of eatables mixed with non-permitted food colours, may lead to potential health hazards such as irreversible degeneration of the seminiferous tubules, testicular

lesions, formation of multinucleate giant cells and binding of the dye to serum tissue proteins (Khanna *et al*, 1973). It is evident from the survey at National Institute of Nutrition, Hyderabad that metanil yellow and orange II are the most common non-permitted food colours in various food products. Our earlier studies with adult Wistar male albino rats after daily intake of 3% metanil yellow in synthetic diet (20% casein) for 45 days showed significant decrease in food intake and body weight as compared to the control group of rats with normal diet (20% casein). Similarly, there has been significant decrease in the weight of body organs such as kidney, heart, lung, stomach, caecum and testes as compared to the control group of rats. Our experiments further revealed that feeding of 3% metanil yellow in control synthetic diet showed substantial increase in reductive and hydrolytic activity in the caecal microflora of rats as compared to the control group of rats. This clearly shows that people consuming foods containing hazardous food colours are capable of producing enzymes responsible for cleavage of food colour at a rapid rate thereby causing accumulative toxicity (Singh, 1993). The type of diet and frequency of feeding affects the type of microflora in the intestine. Western diet being rich in animal proteins and fat contained more bacteroids and facultative anaerobes. Lactobacilli were observed to be lower in the faeces of the western population (Aries *et al*, 1969; Drasar *et al*, 1973).

The gastro-intestinal tract (GIT) of various animal species may play a significant role in the toxicity of food colours through metabolism in gut, thus modifying the mode of toxicity. The food additive or its metabolites during degradation may undergo enterohepatic blood circulation, thus prolonging exposure and delayed excretion, causing toxicity. The food additive may undergo changes in morphology of gut microflora, its function, affecting the alteration in physiological condition (Rowland and Walker, 1983).

The reduction of azo compounds in the GIT has an important toxicological significance. The amines produced by azo reduction may themselves be toxic or be converted into toxic metabolites in the tissue after absorption. The introduction of 1-amino-2-naphthol and 2-amino-1-naphthol as the breakdown product of orange II, induced local tumour formation into the lumen of the bladder of mouse (Daniel, 1962; Clayson and Garner, 1976; Watable *et al*, 1980). The interspecies differences also lead to different toxicity response to food colours. This suggests that the toxicity of an azo dye depends to a large extent on the rate at which bacterial systems reduce azo linkage. Besides azo dyes, the other poorly absorbed colours are metabolized by gut microflora. Therefore, the intact sulfonated triphenylmethane compounds are largely excreted in the faeces unchanged, accounting for low toxicity. Unlike many polar azo dyes and their metabolites, the triphenylmethane compounds are not responsible for any alteration in gut morphology (Brown *et al*, 1980; Philips *et al*, 1980).

India produces about 135 tonnes of synthetic food colours and this is just about 1.5% of the world production of food colours.

Besides, the degradation of food colours through gut flora, the ingested food colours along with food causes adverse changes in the body. As per the recent evidence, some food colours such as erythrosine, orange II and rhodamine B at the permissible levels react with proteins and carbohydrates to harm the carbohydrate digestion. Amaranth, tartrazine and erythrosine react with mineral ions such as copper, iron and zinc in foods, affecting their absorption in small intestine. This may lead to deficiency-linked disorders in the human body. Other food colours such as tartrazine and metanil yellow reduce the level of vitamins A and E in the body during continuous intake of colours in the diet (Anon, 1996).

Status of Synthetic Food Colours

Out of the 8 colours permitted for food use under Prevention of Food Adulteration Act, there are red, 2 yellow, 2 blue and 1 green synthetic colour. However, 9 colours are listed as non-permitted colours on the basis of toxicological studies. The permitted and non-permitted food colours are presented in Table 1. India produces about 135 tonnes of synthetic food colours and this is just about 1.5% of the world production of food colours. Among the permitted food colours, sunset yellow FCF and tartrazine accounts for 70% net production. Apart from fast green FCF and brilliant blue FCF, which are still imported, the other permitted food colours to cater the domestic requirements only. The Indian population consumes 220 mg of food colours per year which is 50 times less than the per capita intake of food colours in USA and 35 times less than UK (Walford, 1980).

Identification of Food Colours

Synthetic food colours are characterized by their high water solubility, ability to produce different shades of colours and their relative stability in foods with temperature and acids. Food

Table 1 : Permitted and Non-permitted Food Colours in India

Name of dye	Colour index name	Colour index number
	Permitted	
Azo Dyes		
Carmoisine	C.I. Food Red 3	14,720
Ponceau 4R	C.I. Food Red 7	16,255
Sunset yellow FCF	C.I. Food Yellow 3	15,985
Tartrazine	C.I. Food Yellow 4	19,140
Triaryl Methane Dyes		
Brilliant blue FCF	C.I. Food Blue 2	42,090
Fast green FCF	C.I. Food Green 3	42,053
Indigold Dye		
Indigo carmine	C.I. Food Blue 1	73,015
Xanthene Dye		
Erythrosine	C.I. Food Red 14	45,430
	Non-permitted	
Azo Dyes		
Amaranth	C.I. Food Red 9	16,185
Fast red E	C.I. Food Red 4	16,045
Metanil yellow	C.I. Acid Yellow 36	13,065
Orange II	C.I. Acid Orange 7	15,510
Diaryl Methane Dye		
Auramine	C.I. Basic Yellow 2	41,000
Triarylmethane Dyes		
Blue VRS	C.I. Food Blue 3	42,045
Green S	C.I. Food Green 4	44,090
Malachite green	C.I. Basic Green 4	42,000
Xanthene Dye		
Rhodamine B	C.I. Basic Violet 10	45,170

colours exhibit good fastness properties with light, alkali, fruit acids, benzoic acid, sulphur dioxide and stability at higher temperature such as 105^0-205^0C. Synthetic food colours develop characteristic colour with concentrated acids and base such as hydrochloric acid, sulphuric acid and sodium hydroxide, which enable for qualitative identification

Extraction and Resolution of Metabolites

Selective extraction method based on differential solvent solubility is generally carried out (Dixit *et al*, 1995). The sample is soaked in petroleum ether with occasional shaking followed by filtration. After filtration, the residue is dried at room temperature and shaken with ethanol with occasional heating in a water bath, after which the solvent is decanted. The combined filtrate is evaporated to remove ethanol and the residue is taken in distilled water. The

colours from water phase are then selectively extracted in 2-3 ml of acidic n-butanol. The small volumes of acidified n-butanol serve the purpose of qualitative detection. However, repeated extractions with n-butanol is followed for quantitative determination. The combined butanol extracts are dried under vacuum.

The butanolic coloured layer was applied onto a Whatman No.1 chromatography paper strip, together with standard colour sample and run for 8-10 hrs in either of the following 2 solvent systems (Crossby, 1981).

Solvent A: Trisodium citrate: ammonia : water (2 g: 85 ml) for pink-red, orange and yellow synthetic colours.

Solvent B: Isopropanol: ammonia: water (7: 2 : 1 v/v) for blue, green and yellow synthetic colours.

R_f values of separated colours are compared and matched with R_f values of reference dyes. The separated spots of various aromatic amines were visualized either by viewing under ultraviolet viewer or after spraying the chromatogram with Bratton-Marshall spray reagent.

Impurities in Food Colours

Food colours contain various metal contaminations such as lead, cadmium, manganese, nickel, zinc, copper, chromium and arsenic, which may arise from raw materials during processing. Joint FAO/WHO Expert Committee on Food Additives recommended that increased attention should be given to reduce the trace element impurities in food colours. Therefore, particular attention should be paid to ensure that free amine content of colours is kept below 0.02%. The use of sophisticated analytical techniques such as high pressure liquid chromatography has resulted in the identification of impurities like α and β-naphthylamine in certain azo colours. These contaminants arise mostly from non-sulfonated amine moieties, which may occur as impurities in raw materials. Food colours should not contain more than 1-3 ppm arsenic, 20 ppm chromium, 1 ppm each of copper and lead (Khera, 1979). Food containing lead chromate causes vomitting and diarrhoea in persons and many human population developed severe allergic reactions after consuming foods with carmine, a natural dye extracted from a group of insects (Anon, 1996). The maximum permissible limit should be strictly adhered to benefit the consumers. The strict adherence of maximum metal limit would encourage the industry to select good quality raw materials, processing equipments and containers, which should eliminate the inherrent health hazards to the vast section of consumers.

Food colours contain various metal contaminations such as lead, cadmium, manganese, nickel, zinc, copper, chromium and arsenic, which may arise from raw materials during processing.

Easy retail availability of permitted food colours in tamper proof small strip packs along with suitable rapid and reliable methodology will considerably help in overcoming the large scale indiscriminate uses of non- permitted food colours in various food products.

Conclusion

The use of food colours has become a prominent feature of the present day food processing industry. The restrictive supply avenues of permitted colours together with their high cost are detrimental factors in promoting their use. On the contrary, the easy availability in small quantities and in cheap packing make non-permitted colours much more easily accessible. This, coupled with ignorance plays a significant role in the continued popularity of non-permitted colours. Easy retail availability of permitted food colours in tamper proof small strip packs along with suitable rapid and reliable methodology will considerably help in overcoming the large scale indiscriminate uses of non- permitted food colours in various food products.

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Role of Phosphates in Food Processing

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Introduction

Phosphoric acid and its salts with sodium, calcium or alumium impart many desirable characteristics to foods and enable the production of certain products, which otherwise would be practically impossible to be manufactured. The popularity of these food ingredients is based on their nutritive value, economics and diverse functionality. Selective addition of phosphates to human food in desirable quantities to a large extent, maintains the stability of the protein-fat-water dispersion or emulsion by controlling the various processing factors, including heat treatment, pH change, bacterial or enzymatic activity etc. Compounds of phosphorus are used as ingredients/additives to control/improve body, texture and flavour in a variety of cheeses, baked foods, meat, fish, soft drinks, various dairy products and foodstuffs, where they serve as curing acids, emulsifiers, leaveners, acidulants, buffering agents, chelating agents, preservatives, stabilizers and nutritional supplements. Phosphates are not only adding their inherent nutrient value, but are also used to change such properties as texture, consistency, uniformity and appearance of the food product. Many food formulators have skillfully used phosphates, which have been considered safe for years and may continue to be so in future also.

Structure and Classification

All phosphates exhibit chemical structure in which each phosphorus atom is more or less tetrahedrally surrounded by four oxygen atoms. Phosphates may be conveniently divided into two general classfications: Orthophosphates and Condensed phosphates.

Phosphates are not only adding their inherent nutrient value, but are also used to change such properties as texture, consistency, uniformity and appearance of the food product.

Orthophosphates :- The lone PO_4 group corresponding to the orthophosphates moiety may be present as a triply charged anion or as structure in which there are covalent bonds from one or more of the four oxygens to atoms other than phosphorus. Orthophosphates belong to the largest group and are perhaps the most important to the food processing industry.

Orthophosphate

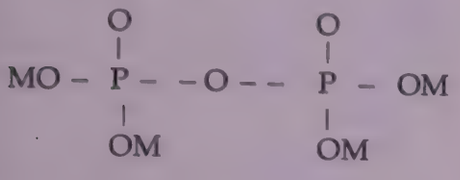
M stands for one equivalent of a metal ion or hydrogen, etc.

Condensed Phosphates:- If one to three carners of PO_4 tetrahedra are shared through an oxygen atom common to each pair of tetrahedra so as to produce P-O-P bonds, the resulting structures are called condensed phosphates. Condensed phosphates may be further classified into:- a) Chain polyphosphates, b) Metaphosphates or cyclic polyphosphates and c) Ultraphosphates or branched chain/ring polyphosphates.

Chain Polyphosphates:- The name "Polyphosphate" covers a group of compounds having two or more phosphorus atoms joined by an oxygen bridge in a chain structure of the generic formula $M_{n+2}\ P_n\ O_{3n+1}$. Some of these are crystalline, while others occur only as glasses. When n=1, this generic formula corresponds to orthophosphate.

The first members of this series (n=2) normally referred to as

pyrophosphates, have one P-O-P linkage in which 2 end groups are connected as a result of the sharing of one oxygen atom between two PO_4 moieties like,



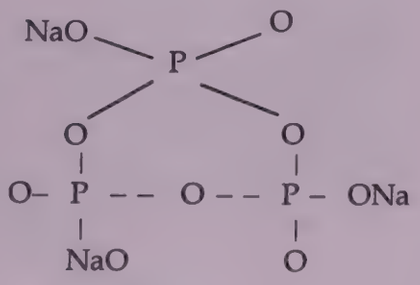
The commercially available product representing this group of compounds is with one exception that is optically crystalline and well characterized.

Phosphates and polyphosphates are used extensively in food processing because these substances occur naturally in foodstuffs consumed by man.

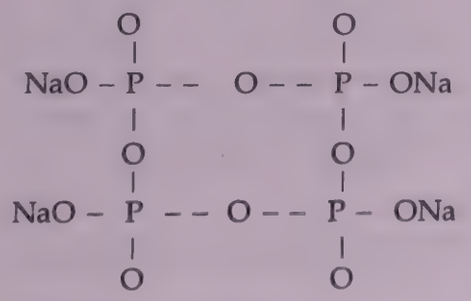
The next in the series of polyphosphates is the triphosphate or tripolyphosphate (n=3), a three phosphorus chain. Polyphosphates are sometimes identified by chain length, which refers to the number of phosphorus atoms in the chain. Such chain phosphates comprising hundreds of phosphorus atoms can be prepared. In the case of the longer chains, size distributions, rather than collections of chains all having the same length, result from the various methods of preparation.

A common physical form for the longer chained phosphate with a small amount of cyclic phosphates) is a glass and has been incorrectly called sodium hexametaphosphate. It is sometimes referred to as Graham's salt and structurally exhibits an average chain length of 10 to 25 phosphorus atoms per molecule. The "hexameta" designation is a complete misnomer. The product is neither a metaphosphate nor is it a hexamer. Since these materials are mixture of chains of varying lengths, they should be identified by their average chain length.

Metaphosphates:- The cyclic phosphates, which have not been used to any extent in food applications, have the generic formula $M_n P_n O_{3n}$; the most common representative of this class of compounds is sodium trimetaphosphate, for which n=3. There are two true metaphosphates, whose chemical properties are quite different from those of the polyphosphates. Both of these compounds are crystalline. They are sodium trimetaphosphate, structurally a six membered ring and sodium tetrametaphosphate, an eight member ring. They have an M_2O/P_2O_5 ratio of 1.00.



Sodium Trimetaphosphate



Sodium Tetrametaphosphate

Ultra phosphates:- Ultraphosphates are those having an M_2O/P_2O_5 ratio less than 1.00. Structurally, they are believed to be branched chains or rings or combinations of chains or rings. They have little commercial significance. An example of such a structure is the smallest branched - chain compound, isotetrapolyphosphate, $(M_2O_3PO)_3PO$.

Preparation

Phosphoric acid is produced from elemental phosphorus (p), air and water. Three available hydrogen of it can be replaced one by one with appropriate alkali metals forming a series of monophosphate or orthophosphate salts.

Orthophosphoric acid itself is used as an acidifying agent in various food preparations, such as cola drinks.

These can also be made by neutralizing phosphoric acid with a suitable alkali, such as sodium-, potassium- or calcium-hydroxide and drying the mixture.

Calcining the neutralized mixture of phosphoric acid and alkali in the temperature range of 300^0 to 1200^0C would lead to removal of water and production of a pyrophosphate, polyphospate or metaphosphate, containing 2,3 or more phosphorus atoms per molecule, having many properties different from the monophosphate. The number of phosphorus atoms in each molecule of condensed polyphosphate can further be increased by melting and chilling to form a glass, e.g., sodium hexametaphosphate.

Functional Properties

Phosphates and polyphosphates are used extensively in food processing because these substances occur naturally in foodstuffs consumed by man. The ortho-, pyro- and triphosphates occur in all kinds of natural foods. The very long chain polyphosphates are found in such traditional human foodstuffs as fungi and cultures of microorganisms. Phosphates and polyphosphates also affect the various functional properties of the food products of which they become a part. These effects can be ascribed to the properties of the phosphates themselves, which are categorized into 6 classes. Of course, a given food application may involve several of these categories, which may not be mutually independent.

Acidic and pH buffering properties :- The acid salts of ortho- and pyrophosphate are good solid phase sources of acidity. Acid salts of the longer chain polyphosphates have not found application as acidifying agents because of their relatively short buffering range in the pH region from 5.5 to 7.5, and also they are somewhat difficult to prepare.

Orthophosphoric acid itself is used as an acidifying agent in various food preparations, such as cola drinks. Orthophosphoric acid is about 20 times less expensive to use than are such organic acids as citric, malic and tartaric. The ortho- and pyrophosphate anions are good buffering agents for the three pH ranges of 2 to 3, 5.5 to 7.5, and 10 to 12. The polyphosphate anions are not good buffering agents in the pH range of 5.5 to 7.5 and their buffering ability decreases with increasing chain length.

Sequestration :- Polyphosphates act to complex metal cations in solution, thereby rendering them sequestered. The soluble complexes involving the polyphosphates and metal cations are in a dynamic equilibrium with the free-metal ions plus the free polyphosphate.

Precipitation reactions and insoluble materials :- Polyphosphates are not only good sequestering agents, but also form insoluble salts with multiple charged metal ions. This is also true of the orthophosphates. Such highly insoluble materials as calcium pyrophosphate, dicalcium orthophosphate dihydrate or an insoluble sodium metaphosphate are employed as polishing agents. On occasions, phosphates will form unwanted broken glass like crystals in foodstuffs, such as formation of struvite in canned fish.

Blends of monobasic and dibasic phosphates are very strong buffers and are used for maintaining foods in the neutral pH range.

Pyrophosphates are good sequestrants for iron and copper and hence, useful in preventing oxidative darkening of fruits and vegetables.

Surface sorption :- Polyphosphates have their ability to become sorbed on surfaces and hence affect the charge of the surface. Such changes in surface charge appear strongly in colloidal systems, where the surface area is of course particularly large. By increasing the negative charge on colloidal particle (usually suspended solids), the polyphosphates act to cause deflocculation, dispersion, peptization, emulsification and colloidal suspension in aqueous media. The common example is the application of polyphosphates in water treatment.

Polyelectrolyte behaviour:- The complex theory of polyelectrolyte behaviour of polyphosphates refers to their interaction of highly charged anions with cationic functions of large molecules, e.g., phosphate-protein interaction. In strongly acidic solution, polyphosphates utilize completely the so- called acid combining capacity of the proteins so that all the amino groups are neutralized by the phosphate. When a sufficiently long chain phosphate is employed, a given phosphate molecule can interact with a number of sites on the protein, and thus increases considerably the entropy requirements for desorption of the phosphate chain from protein macromolecules.

Nutrition supplementation :- Without a supply of phosphorus, no form of life can exist. The portion of commercially available elemental phosphorus equivalent goes into compounds used for nutritional purposes in plant foods (i.e., fertilizers) and little in foods for animals including humans.

Applications

Phosphoric acid is available as colourless and odorless solution. It is miscible with water and alcohol. It imparts a pleasing tartness in food without masking any other flavour. It is an excellent low cost acidulant and can replace organic acids such as citric, malic or tartaric acid. Phosphoric acid reacts with lime to form insoluble calcium phosphates to act as nuclei or collectors for much of the fine suspended matter in the sugar juice permitting easier filtration.

Orthophosphates vary in pH from moderately acid (pH 3.0)

strongly alkaline (pH 12.0). They make good buffers. They can hold the pH of a food product at any desired level. They can inhibit the harmful growth of bacteriophages by precipitating free calcium and iron in starter culture and thus protect the beneficial bacteria. Monobasic phosphates may react with sodium bicarbonate to produce effervescence, which is useful in many food products. The added orthophosphate may chelate with free calcium ions and bind to casein, thereby increasing the colloidal calcium phosphate. Hence, native proteinase activity in milk is reduced.

Dibasic phosphates are mildly alkaline and are used to reduce acidity in foods. Blends of monobasic and dibasic phosphates are very strong buffers and are used for maintaining foods in the neutral pH range. Tribasic phosphates are strong alkaline and used to correct excess acidity in foods, where an alkaline condition is required.

Pyrophosphates are good sequestrants for iron and copper and hence, useful in preventing oxidative darkening of fruits and vegetables. They can also prevent oxidative rancidity in meat, poultry and fish. Formation of struvite, a crystalline glassy piece, is effectively inhibited by the addition of a small amount of pyrophosphate to canned fish. Pyrophosphates as leavening acid in baking impart different rates of reaction and generate bubbles of carbon dioxide with sodium bicarbonate to produce cellular structure.

The sequestering/chelating ability of polyphosphates is very much useful for controlling oxidative rancidity and colour formation during preparation and storage of foods as both are catalyzed by metal ions. Tripolyphosphates and hexametaphosphates have better sequestering power towards calcium and magnesium and hence, produce soft water by binding these elements. Sequestration is also used to soften the skins of fruits and vegetables for faster cooking, increase the extraction and recovery of pectin from fruit, improve solubility of meat in strong pickling brine or prevent hardness precipitation in hard water. Solubilization of proteins by tripolyphosphates aids in binding diced cure meat fish and poultry. Sequestering of the nutritional minerals needed for survival and growth of bacteria exhibits bacteriostatic action of polyphosphates.

Phosphates can control the flavour of baked products, because it depends in part on the final pH.

Tripolyphosphate "reaction" with proteins in meat, fish and poultry prevents denaturation and thus loss of fluids. "Moisture binding" property of phosphates causes animal foods to be more flavoured, juicy, tender and nutritious by retaining liquid proteins, emulsified fat and dissolved minerals. Phosphate treatment reduces the loss of fluids due to "freezer burn" during frozen storage of foods. Treatment with polyphosphates will also inhibit rancidity and prolong storage life of foods.

Phosphate reaction with proteins enhances heat stability of milk and prevents separation of proteins from the fat and water phases in evaporated milk, sterilized milk and cream. However, excess addition of phosphate causes coagulation or setting of the milk proteins to form stiff gels. This effect is utilized in recovery of protein from whey and also in making instant puddings. Phosphates maintain oil-protein-water suspensions or emulsions stable in processed cheese, imitation dairy products, salad dressings, ice cream and sausage.

Phosphates can control the flavour of baked products, because it depends in part on the final pH. Phosphate dough conditioners provide optimum acidity for yeast activity and inhibit the growth of bacteria responsible for "rope" formation in breads. In bread making, phosphates serve as nutrients for yeast. Phosphates keep the fillings of jelly rolls and jelly doughnuts from 'weeping' into the cake. Sodium phosphates can be used to convert starch and modify its gelatin and stability characteristics.

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Need for Reappraisal of the Permissible Limit of Sulphur Dioxide in Jaggery

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Introduction

During the process in sugar mills clarification, the cane juice is heated to 70^0C and milk of lime of 15^0 Brix is added to the extent of 1.0 to 1.5% by volume of the juice. Sulphur dioxide gas content (8 to 11%) is then passed through the juice to such an extent that the alkalinity produced due to the addition of the lime is brought to neutrality. The treated juice is heated to boiling (103 to 112^0C) and clarified. The clear juice is sent to the evaporators for evaporation. The syrup obtained from the evaporators is again sulphited by passing sulphur dioxide gas in order to bleach it further and also to precipitate any lime salt present and thereby improve the quality of sugar. The syrup with or without simple filtration is sent for crystallisation as sugar in vacuum pans.

More or less the same procedure has been followed in jaggery industry by the farming community in recent years. A substance known as "hydros" in trade parlance (sodium hydrogen sulphite) is being used on a fairly large scale to improve the colour of jaggery. Lime is added to the raw cane juice to the required extent and the juice is boiled initially at low temperature. This facilitates flocculation of colloids and the scum that rises to the surface of the juice is skimmed off. After removal of the initial scum, some quantity of hydros is applied to the warm juice and heated for bleaching and also to precipitate any lime salt present and thereby improve the colour of jaggery. When the charge is about to be brought down, some more quantity of hydros is sprinkled in the pan. Then, sulphur dioxide is evolved and it bleaches the magma. After complete solidification of jaggery, some amount of sulphur dioxide is naturally retained in the jaggery.

According to prevention of food adulteration rules of the Government of India, 70 ppm sulphur dioxide is permissible in the jaggery.

When the quality of cane is poor, more hydros is applied to bleach the juice. This will mean retention of more sulphur dioxide in the jaggery.

According to prevention of food adulteration rules of the Government of India, 70 ppm sulphur dioxide is permissible in the jaggery. This amount (70 ppm) works out to 7 g of sulphur dioxide or 3.5 g of sulphur per quintal of jaggery. If for 400 litres of cane juice, 100 g of hydros is added, there will be 8 to 12 g of sulphur dioxide (or 4 to 6 g of sulphur) per quintal of the resulting jaggery. At this rate of application of hydros, the jaggery is not likely to be bleached at all. Hence, some cultivators apply 4 to 5 times the quantity of hydros in order to make jaggery of golden yellow colour. In such a jaggery, more than 30 to 60 g of sulphur dioxide (15 to 30 g of sulphur) is likely to be present in a quintal of jaggery. But, this level of sulphur in jaggery is distinctly less than the levels of sulphur in 100 kg of several foodstuffs like brinjal (44g) rice (53 g), jowar (54g), cabbage (67g), jack fruit (69 g), maize (114 g) wheat flour (122g), drumstick (137 g), pearl millet (147 g), fingermillet (160 g), Bengalgram *dhal* (160 g), blackgram *dhal* (174 g), redgram *dhal* (177 g), greengram *dhal* (214 g) cauliflower (231 g), deoiled coco-nut meal (431 g) etc. (Dewan 1994;

Gopalan *et al.*, 1996). Milk contains 270 ppm parts of sulphur (Bear 1959). The human milk contains 274 mg of sulphur containing amino acids per gram of total nitrogen as compared to 211 mg in cow's milk (Report of Joint FAO/WHO Expert group, WHO/Technical Report Series 301 General 1965). A diet containing 100 g of mixed protein will provide 0.60 to 1.68 g of sulphur. There is always a little inorganic sulphate in the diet and most foods contain small amounts of organic sulphur (Davidson and Passmore 1966). So, even the level of 30 g (600 ppm sulphur dioxide) of sulphur in jaggery may not be injurious to human health. Jaggery prepared by the addition of hydros gave initially a good yellow colour, but the colour deteriorated to greenish dark on keeping for about 2-3 weeks (Ranadive 1987). This may be due to progressive reduction of sulphur dioxide content in the jaggery on storage. As jaggery prepared during December to March-April is stored and used throughout the year, it can be said that the sulphur dioxide content of jaggery gets reduced to a certain extent by the time it is used. Jaggery is used for making foodstuffs after boiling the same. After boiling, sulphur dioxide-treated foods usually have about 1 ppm or less SO_2 remaining in the foods (Manoranjan Kalia and Sangita Sood 1996).

Moreover, the jaggery prepared without using hydros is found to contain upto 67ppm parts of sulphur dioxide of jaggery (Annual Report of Indian Institute of Sugarcane Research. Lucknow 1961- 62). It is more or less similar to the permissible limit, suggesting that no hydros can be added to improve colour, if the jaggery has to have sulphur dioxide content within the permissible limit.

Sulphur dioxide present in the jaggery is evidently from the cane used for jaggery making. Sulphur removed by a tonne of millable cane was found to be around 300 g (67th Annual Report of Bureau of Sugarcane Experimental Station, Queensland 1966-67; Tandon 1995). This amounts to 600 ppm parts of SO_2 . The juice extracted from such a cane is likely to have about 400 ppm SO_2 . Sulphur content in third order leaves ranged from 0.143% to 0.198% in plant crops of different cane varieties. It was found to be less in ratoons (67th Annual Report of Bureau of Sugarcane Experiment Station Queensland 1966-67). Besides, the sugarcane crops receive about 700 kg of super phosphate per hectare to supply 112 kg P_2O_5 per hectare. The super phosphate applied, besides supplying P_2O_5, also supplies about 84 kg of sulphur to the cane crops. So, naturally sulphur content of the cane crops increases with application of super phosphate. Badigar *et. al.*, (1985) reported an increase in sulphate of sulphur with sulphate treatments. In fact, some farmers add super phosphate to the raw cane juice with a view to improve the colour of the jaggery. In red soils of Andhra Pradesh, total organic sulphur varied from 904 to 2504 ppm and from 789 to 2405 ppm, respectively (Reddy *et al.*, 1988). The abundance of sulphur in black soils of the State followed the order; total sulphur (660-2310 ppm) and organic sulphur (662-2266 ppm) (Pillai 1994). Total sulphur content of surface soils in India ranged from 19 to 1750 ppm (Das *et al.*, 1995). Washnik *et al.*, (1981) observed that available sulphur in both surface and sub-surface soils increased from 6 to 246 mg and 5 to 433 mg Kg^{-1}, respectively with the addition of sulphur. The sulphur content in 3-6 leaf blades of sugar cane varied from 300 to 1000 ppm (Schmehl and Humbert 1964). Varying levels of sulphur status of soils including sulphate application induce different levels of sulphur in cane plants, cane juices and jaggeries. All these factors must be taken into consideration, while fixing the permissible limit of sulphur dioxide in the jaggeries.

Varying levels of sulphur status of soils including sulphate application induce different levels of sulphur in cane plants, cane juices and jaggeries.

Moreover, the sulphur uptake per 100 kg of main produce of many foods i.e., rice (289 g), maize (305 g), wheat (307 g), greengram (699 g), blackgram (704 g), groundnut (904 g), sunflower (948 g), gingelly (1167 g), safflower (1273 g), mustard (1665 g) etc. consumed by a human being is distinctly higher than that in sugarcane (30 g) (Tandon 1995).

Earlier, Tandon (1986) reported that sulphur uptake figures ranged from 5 to 96 kg per hectare depending on the crop, its yield level, rates of sulphur application and site characteristics.

The sulphur content of the body of a person of 70 kg weight is about 100 g (Dewan 1994). Sulphur is ingested chiefly in the form of sulphur containing amino acids, cysteine, cystine and methionine. Some of the ingested sulphur containing amino acids are used to repair or build up the tissue proteins. Hair, for example, contains large amounts of cystine. Small amounts of the sulphur containing amino acids are used in the synthesis of insulin, glutamyl cysteyl/glycine and β-mercapto-ethylamine. Cysteine is utilised in the formation of taurine, which combines with cholic acid to form the bile acid, taurocholic acid. The majority of the sulphur containing amino acids, however, are catabolized in the liver like other amino acids. The nitrogen goes to form urea and the sulphur is oxidized to sulphuric acid, which

appears in the urine as sulphate. A diet high in protein, therefore, increases the output of sulphur in urine. The total output of sulphur in urine of a normal student of Glassgow University in October 1955 on a high (1.44 to 1.66 g) and a low (0.60 to 1.42 g) protein diet was found to vary from 0.60 to 1.66 g per day during 2nd to 4th day after taking the protein diet. The increase in the excretion of amino acids having sulphate radicle might be due to failure of renal reabsorption, mechanism to deal with the amino acids or due to defective renal tubular reabsorption leading to inadequate absorption of one or more amino acids. (Bell *et. al* 1972). The urinary output of sulphur is upto 2 g daily, most of which is as sulphate, but there is always a small amount of organic sulphur (Davidson and Passmore 1966).

The per capita consumption of jaggery and *khandsari*, which used to be 15.2 kg per annum during 1960-61 has reduced to 10.7 kg per annum by 1994-95 in India (Cooperative Sugar, December 1996). This works out to nearly 30 g of jaggery per day including *khandsari* sugar. Even assuming that hydros-treated jaggery contains 300ppm sulphur , 30 g of jaggery consumed per day will have 9 mg of sulphur. But, a human being excretes nearly 2 g of sulphate every day through urine.

Sulphur containing compounds are extremely useful to mankind. Sulphur dioxide is a permitted preservative in food regulations (Garrow and James 1975). Sulphur dioxide is widely used throughout the world in the preservation of juices, nectars, squashes, crushes, cordials and other products, (having generally a pH of 2.5 to 3.5) because of its preservative action against bacteria and moulds. Although sulphur dioxide can retard the development of yeasts in the juices, it can not arrest their multiplication, once their number has reached a high value. So, sulphur dioxide has been found to be of wider use in the fermentation industries, such as wine making. Sulphur dioxide retards the development of both enzymatic and non-enzymatic browning or discolouration of the product. Notable are the uses in the treatment of prepared apple slices, peeled potatoes and other fruits and vegetables to prevent browning. In addition, sulphur dioxide acts as an antitoxidant and bleaching agent and is used extensively in textile, sugar and jaggery industries. It is generally used in the form of its salts such as sulphite, bisulphite and metabisulphite for the purposes mentioned above.

Sulphur dioxide is widely used throughout the world in the preservation of juices, nectars, squashes, crushes, cordials and other products, because of its preservative action against bacteria and moulds.

According to Morris (1946), the permitted limits of sulphur dioxide in various foodstuffs varied from 1000 to 2500 ppm in Japan and France (1000 ppm), Austria and Hechoslovakia (1250 ppm), USA, Great Britain and Switzerland (2000 ppm) and Canada (2500 ppm).

The permissible limits of sulphur dioxide in India are as follows:- (1) Fruit, fruit pulp or juice (not dried) for conversion into jam or crystallized, glazed or cured fruits (a) cherries- 3000 ppm, b) straw berries and rasp berries-2000 ppm and c) other fruits -1000 ppm (2) Fruit juice concentrates (1500 ppm) (3) Dried fruits like apricots, peaches, apples, pears and other fruits (2000 ppm) and raisins and sultanas (750 ppm) (4) Squashes, crushes, fruit syrups, cordials, fruit juices and barley water (350 ppm) (5) Jam, marmalade preserve, canned cherry and fruit jelly (40 ppm) (6) Crystallized, glazed or cured fruit (150 ppm (7) Sweetened and ready- to- serve beverages (70 ppm) (8) Pickles and chutneys made from fruits or vegetables (250 ppm) (9) Dehydrated vegetables and dried ginger (2000 ppm) (10) Syrups and sherbats (350 ppm) (11) Cider (200 ppm) (12) Wines (450 ppm) (13) Beer (70 ppm) (14) Cornflour and such like starches (100 ppm) (15) Corn syrup (450 ppm) gelatine (1000 ppm) (16) Hard boiled sugar confectionery (350 ppm) (17) Sausages (450 ppm) and (18) Sugar, glucose, jaggery and *khandsari* (70 ppm). (Srivastava and Sanjeev Kumar, 1994).

For the food products directly consumed, that lower permissible limits of sulphur dioxide to have been fixed. But for other fruit products, which are consumed after dilution, higher limits to have been suggested. For preserving raw citrus juices, which are to be stored for some months, for manufacture of squashes in the off season, generally 700 ppm of sulphur dioxide is recommended. Giridharlal *et al* (1966) have suggested that it is preferable to increase this level to nearly 1000 ppm and also add extra citric acid in the case of orange juice, when it is to be stored in wooden cases or barrels. When the juice is converted into squash, containing 25 to 30% of juice, the higher concentration of sulphur dioxide in the stored juice will be suitably reduced so as to be within the prescribed limit.

In a more or less similar fashion, jaggery is normally used as a sweetening agent for making sweets for consumption after boiling the same and mixing with other foods . This practice results

in bringing down the sulphur dioxide content of prepared foods to about 1 ppm. Moreover, the sulphur contents of cane juices and jaggeries increase beyond the so called acceptable limit, based on the prevailing weather conditions, variety, sulphur status of soils on which cane is grown, irrigation facilities available, quantities of super phosphate (sulphur containing fertilizer) applied to soil and to raw juice for clarification. Besides, sulphur dioxide content of jaggery on storage gets reduced. For dehydrated vegetables, dried ginger, dried fruits, the permissible limit of sulphur dioxide is fixed as 2000 ppm. Similarly, for hard boiled sugar confectionery, the limit is 350 ppm. Mango bar consumed directly contains sulphur dioxide to the extent of about 400 to 500 ppm. The SO_2 content of cane juice consumed directly may go upto about 400 ppm. But for jaggery, sulphur dioxide content of which varies on several factors even without addition of hydros, the permissible limit is fixed as 70 ppm. So, fixing an arbitrary permissible limit of sulphur dioxide content in jaggery without considering the several agronomical practices adopted by the farmer in raising cane and preparing jaggery does not appear to be realistic and is beyond anyone's comprehension. So, there is an urgent need to re-examine the issue with all due care for fixing realistic and practicable permissible limit for sulphur dioxide in jaggery.

As already indicated, in jaggery industry, hydros (sodium hydrogen sulphite) is being used on a fairly large scale as a bleaching agent to improve the colour of the jaggery to a pleasing and attractive golden yellow. The undissociated sulphurous acid, which forms with the addition of sulphur salts to juices is nearly one hundred times more efficient as a preservative in strongly acid solutions than in neutral solutions (Girdharilal *et. al., 1966*). But the pH of jaggery varies from 5.6 to 6.6 (near to neutrality) and at the pH levels, the concentration of sulphur dioxide present in jaggery, though high, is not adequate enough to prevent the growth of yeast, moulds and bacteria on jaggery to enable hydros to act and to be called as a preservative. In fact, organisms develop to a great extent even in the hyros- treated jaggeries. The sulphur dioxide concentration should be around 5000 ppm, if sulphur dioxide (hydros) is to act as preservative in the case of foodstuffs (jaggeries) having a pH of 5.6 to 6.6 for preventing the growth of organisms. But, sulphur dioxide concentration may be rarely around about 500 ppm in very few jaggeries prepared using hydros. Thus, hydros is not utilised as a preservative, but used only for improving the colour of jaggery as a bleaching agent.

The symptoms of adverse effects of sulphur dioxide may include dizziness, chest pain, eye irritation and difficulty in breathing.

When sulphur dioxide is not used as a preservative but when used as a bleaching agent, the provision of the prevention of Food Adulteration Act (not more than 70 ppm sulphur dioxide per million as a preservative is permissible in jaggery) appears to be not realistic, taking into consideration the several aspects mentioned above.

As the sulphur dioxide content in the jaggery is found to be more even under natural conditions and without human interference, the permissible limit requires to be suitably amended in the interests of natural justice, which otherwise would cause serious hardships to the innocent jaggery producers and also jaggery traders.

According to Harold (1963), sulphur content of plasma or serum is found to vary from 0.5 to 1.5 milliequivalents per litre. The maximum recommended sulphur dioxide exposure for community air is 0.5 ppm. The symptoms of adverse effects of sulphur dioxide may include dizziness, chest pain, eye irritation and difficulty in breathing. Longer exposure may result in bronchitis and emphysema (a pathological condition of the lungs in which air sacs lose their elasticity and exhaling becomes difficult.). Sulphites widely used to keep salads from wilting or avocado dips from discolouring may present a serious health threat , upto 5% of asthmatics. Certain individuals have severe reactions to metabisulphites: faintness, difficulty in breathing, cough, blue discolouration and loss of consciousness. Urinary tract infections are treated medically with sulpha drugs. But these drugs have destroyed red blood cells in 15% of black people (Girdano *et al*, 1985). Thus, the hazardous effects of sulphur dioxide appear to be mainly confined to lungs, breathing and red blood cells in black people. So, there is a need to set tolerance levels for sulphur dioxide content in jaggery taking all the facts.

No additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal. (Girdando *et al.*, 1985). Staff (1983) has observed that 143 chemicals are present in meat. Of these chemicals 20 are linked with birth defects, 6 are suspected of carrying mutations and 42 may be carcinogenic. The Food, Drug and Costmetic Act of 1938 of United States protects consumers against toxic food additives and was amended in 1958 by Delaney amendment. The Delaney amendment (1977) invoked to ban

the use of saccharin (an artificial sweetener, but identified as likely to cause cancer of bladder and liver). The outcry from the public against the ban of their popular sweetener was so great, that the congress acted to allow saccharin to be sold once again provided that it was labelled with a warning statement that it may be hazardous to health. High refined sugar and flour consumption (stripped off all their nutrients like glucose, fructose, proteins, fats, minerals and vitamins) have been associated with cancer of the colon, breast and pancreas (Girdano *et al* 1985). But, their sale is not banned. Jaggery containing glucose and fructose (10.0%) proteins (0.25%) fats(0.025%) calcium (75 mg) phosphates (38 mg) iron (11mg) copper (56mg) vitamin B_1 (10.4 units) vitamin B_{12} (2.7 units) in 100 g (Biswas 1938; Anon 1940) does not seem to have been reported so far as carcinogenic. So, imposing restictions on jaggery, which is more nutritious than sugar and thus a better nutritive diet of a poor man, is beyond any one's comprehension.

In the light of facts stated in this article, there is an urgent need for reappraisal of the permissible limit of sulphur dioxide in jaggery.

There is an urgent need to educate the farming community and the society on the possible deleterious effects of using hydros indiscriminately, besides fixing realistic and practicable permissible limit of sulphur dioxide content in jaggery.

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Rajindera Udyog has developed universal grinding machine in different models and sizes. The casting of the body is rigid and strong and high grade cast iron is used in slide making. Guideways are turcite coated and are precision hand-scrapped for long life and slipstick-free movement. The swirelling type workhead can grind angular jobs. The spindle is suitable for live as well as dead centre grinding. The maximum grinding length ranges from 300 mm to 1,500 mm. The machine is equipped with an internal grinding attachment.

For more details, write to :

Rajindera Udyog

35, Model Gram, Street No. 1, Ludhiana, Punjab - 141 002

Waste Water Filtering System

The Flowsorb is a low-flow factory waste water filtering system, based on activated carbon. No power is necessary for the low-flow operation (43 litres/minute flow rate). The granular activated carbon, contained in a sturdy 16-gauge steel drum, provides continuous waste water treatment at different flow rates and concentrations to remove hydrocarbons. It operates at 5 psi, but higher pressure operations are possible with a tight cover over the drum. The Flowsorb can be used for pollution control, ground water cleaning, product purification or de-colouration, water treatment, carbon absorption pilot testing, monitoring well water treatment, etc.

For more details, write to :

Techno Team Sales

A-29/1, Anna Nagar, Chennai - 600 102

Water Chiller

Melicon Engineers Pvt. Ltd. has introduced a state-of-the-art skid mounted water chiller for cooling from 0.5 TR to 45 TR capacity. The system is compact in design and is provided with a digital temperature controller. This chiller is complete with pump and stainless steel tank with coil chiller fully insulated. The tank system has a distinct advantage over shell and tube chiller in terms of breakage of coil due to ice formation; coil is repairable at site and space requirement is less. The system is fully closed loop with almost negligible wastage of water at low running cost. Applications across industries includes chemical/pharmaceutical process, plastic processing like injection/blow moulding, extruders, lamination, PP film, rigid PVC pipes, etc., calenders (plastic and rubber) paper converting and coating chill rolls; plating and anodising; milk/dairy and food products; lubricants / oil cooling and moisture condensation.

For more details, write to :

Melicon Engineers Pvt. Ltd.

B-297, Okhia Industrial. Area, Phase - 1, New Delhi - 110 020

Industrial Vacuum Cleaners

Minuteman, USA, has developed industrial vacuum cleaners exclusively for use in highly hazardous areas, with UL listing; both explosion-proof and dust ignition-proof. The vacuum cleaner is specially suitable for use in Class I group D and Class II Group F and G atmospheres. The model CRUV cleaner is designed for use in Class I clean room environments to reduce air-borne contaminants - in hospitals, clean rooms, etc. Mercury Recovery Vacuum Systems, with charcoal filter for eliminating toxic mercury vapours during clean-up and special vacuum cleaners for use in textile industries are also available.

For more details, write to :

Power Green

(Division of IAEC Industries Madras Ltd)

Rajamangalam, Villivakkam, Chennai - 600 049

Grinder-cum-Slicer

Twinkle Stars offers the Krishna brand grinder-cum-slicer machine which, chips 10 to 12 kg/hr and drywet grinds-crushes 1.5 to 20 kg/hr almond, cashewnut, groundnut, black pepper, tomato, onion, chilly, ginger, garlic, rice, pulses, etc. The unit is useful to make milk shakes, about 2,500 glasses an hour. It is light weight (39 x26 x 39 cm), and can be operated by 0.25 or 0.5 HP single phase electronic motor.

For more details, write to:

Twinkle Stars

Arya sadan, 3 Dayanand Nagar, Opp Sheth High School

Rajkot- 360 002 Gujarat.

NEW PRODUCTS

Industrial Phosphates and Surfactants

Albright, Morarji & Pandit manufactures various industrial phosphates and surfactants in collaboration with Albright & Wilson Ltd, UK. Among the phosphates offered are: sodium tripolyphosphate used as detergent builder; tetra sodium pyrophosphate as additive to toilet soap; and mono-di-, and tri-sodium ortho phosphates and sodium hexametaphosphate as buffering agents and additives to boiler water. The surfactants offered include: LAB sulphonic acid (acid slurry) for detergent cakes/powders; sodium AO sulphonate as additive to detergents and toilet soaps; and sodium lauryl sulphonate (SLS) and sodium lauryl ether sulphate (SLES) as shampoo bases. Also offered are sulphuric acid and 20% oleum as well as green phos acid as basic raw materials in chemical industries and Albright & Wilson's speciality products such as organophosphates, flame-retardants, biocides and surface treatment chemicals.

For more details, write to:

Albright, Morarji and Pandit Ltd

"Raj Mahal", 3rd Floor

84 Veer Nariman Road, Mumbai-400 020

Tinplate

TCIL manufactured by the hot dip process offers a wide product mix of tinplate Hi silicon, galvanising sheets and black plates on conversion for Tata Steel. They offer a range of tinplates for almost all can making applications both in oil can and non- oil can sizes, such as cans for edible oils, baby foods, processed foods, lube oil, paints, battery jackets, crown corks and printed and lacquered sheets. TCIL has developed the electrolytic tinplate for Open Top Sanitary Cans (OTSE) used exclusively for the canning of processed foods.

For more details, write to:

The Tinplate Company of India Ltd

Golmuri, Jamshedpur,381 003 Bihar

New Cookie

As a part of its new plan to attack the mass market of the Rs 2,500-crore biscuit market in India, the Rs 750-crore Britannia Industries recently launched Tiger Health Force Biscuits. The launch of Tiger biscuits, which contain glucose and milk, is Britannia's way of challenging Parle's 55 per cent plus market share in the low-priced glucose segment. Britannia accounts for approximately 38 per cent of the total biscuits market, followed by Parle with 30 per cent and Bakeman's with six per cent.

Available in 75 gms, 100 gms, 200 gms and 300 gms pack sizes, the product is priced at Rs 3, Rs 4, Rs 8.50 and Rs 11.50, respectively.

Some of the well known products of Britannia-the world's second largest bakery products company-include Marie Gold, Jacob's Thin, Good Day, 50-50, Little Hearts, Bread and Merricake.

Fishy Scales

Mumbai-based Omega Electronic Scales has launched an innovative electronic weighing scale for prawns for the first time in India. The electronic scale is expected to improve efficiency and productivity of prawn breeding units spread over the coastal belts of West Bengal, Maharashtra, Kerala, Goa, Karnataka, Tamil Nadu and Pandicherry.

The scales are available in three models of 5kg, 10kg and 25kg and provided with stainless steel sieves to protect against errosion from salt water. These will serve the purpose of dealers, hoteliers and exporters of cold storage items such as prawns and fish.

The unit is priced at Rs 16,500 and retailed directly from Omega's factories at Goregaon and Thane.

Pocket-size, Laser-sighted Portable Infrared Thermometer

Ircon's Ultimax JR infrared pyrometer has a temperature range- 20^0C to 300^0C with an accuracy of +1% reading; and features laser sighting for pin-point accuracy. Other features include: high- and low-limit audible and visible alarm (for quick identification of hot and cold spots); near-instantaneous reading of surface temperature with 0.1^0C resolution (up to 99.9^0C); multiple emissivity function selection; automatic back-lit LCD display; fast response; and

long (battery) life. Typical applications of this non-contact instrument include:measurement of temperature of moving webs in paper/plastic and textile applications; measurement of case temperature of electrical motors;scanning banks of circuit-breakers or fuses; measuring food storage temperature in refrigerated display cabinets; monitoring refrigerated or frozen food temperature, while receiving or transfering food stuff; and measuring surface product temperature (to control colour and taste) in food baking/cooking. The compact unit fits into the palm.

For more details, write to:

Nagman Marketing International Pvt Ltd

10 & 15 Ganesh Nagar,
Alapakkam, Porur, Chennai- 600 116

Pepsi's New Drink

After Pepsi cola and Mirinda, it is now the turn of 7'UP to hit the limelight. The company, Pepsi, after upsizing this clear lemon drink from 250ml to 300 ml, is rolling out a publicity drive linking the brand's green bottle with 'greenness' in its "Clean and Green " campaign across India. Uncorked in Mumbai , with the "Clean Mumbai, Green Mumbai" message, the concept hit Chennai on the seventh day of the seventh month. Building on the '7' theme, the campaign will last for seven days with the Pepsi fun and dance mobile brigade visiting seven spots each day that are typically youth hangouts-colleges, beaches and eat-outs. To syncronize with the brand's green image, planting around 20 saplings at each college is part of the plan.

Target-specific and reportedly cost-effective, the campaign is slated to hit other cities like Delhi and Pune soon.

Food Waste Disposers

The Waste King offers a comprehensive line of food waste disposers and a complete system of accessories to handle any commercial food waste elimination problems. Units range from 1/2 HP for small bars and coffee shops to 10 HP for canning plants and supermarkets. The corrosion-resistant, quiet disposers feature swivel impellers, dynamically balanced stainless steel turntables and long lasting grinding components.

For more details, write to:

Anahellm Marketing Intl, Dept CN

4332 East La Palma Ave,
Anaheim, Callfornia 92807, USA

RESEARCH ROUND-UP

R&D on Development of Natural Food Colourants Through Plant Biotechnological Methods

Plant Cell Biotechnology Department at Central Food Technological Research Institute, Mysore is engaged in production of natural food colourants through plant cell cultures and algal cultures. Since there is increasing preference for natural food colours and there is need for finding out alternative biotechnological means of augmenting the production of natural pigments. There is great deal of interest worldwide in this area of biotechnology.

Saffron (*Crocus sativus*) is a very important food additive both for its colour and aroma. Cultivation of *Crocus sativus* is restricted to certain geographical locations in the world. Moreover, the plant produces only one or two trifid stigma per year, thereby rendering it difficult to produce in very large amounts. One needs to harvest 1,50,000 flowers of saffron to obtain 1 kg of the dry stigma. In view of these difficulties, the biotechnology offers advantages in production of stigma in culture. CFTRI has developed a protocol for *in vitro* production of stigma from ovary culture. However, the scale-up of this system has not been achieved, due to inherent problems on shifting to liquid medium. Most importantly, the colour and flavour profile of stigma obtained *in vitro* match with those obtained from conventional methods.

Hairy root culture technology is fast emerging as an important biotechnological method for production of root-derived compounds. This production is independent of agroclimatic conditions, since it is grown in controlled environment. CFTRI has developed hairy root cultures of *Beeta vulgaris* producing betalaines. The betalaines content in this *in vitro* system is marginally higher than in *in vivo* grown plants of beetroot. The pigment of hairy roots is easily extractable and can be processed for various food formulations. Scale-up of hairy root cultures is being pursued as a sponsored project in the Department of Biotechnology presently.

Cyanobacterial forms are well known for their content of phycocyanin. A process has been developed for downstream processing of cyanobacterial biomass to obtain a blue pigment - phycocyanin. Safety analysis of phycocyanin obtained from *Spirulina* has shown no toxicity in rats used as experimental animals. Phycocyanin finds its use as colourant in icecreams, toffees, beverages and also in cosmetics.

For more information :

G.A. Ravishankar

CFTRI, Mysore - 570 013.

Salmonella in Eggs

A study to determine the effects of infectious bursal disease (IBD) on egg contamination in White Leghorn hens infected with *Salmonella* enteritides (SE) phage type eight has been conducted.

Of 1,050 eggs cultured from the IBD+SE infected hens, SE was cultured from 88 shells, five albumens, and two yolks. In contrast, of 1,258 eggs cultured from the group infected with SE alone, 33 shells were positive and none of the albumens or yolks was positive for SE. All eggs that had SE positive contents also had SE positive shells.

Results of this study also showed that SE could persist in the intestinal tract of orally-infected chicks from day two to 64 weeks of age, thus creating the potential for shell contamination, regardless of whether the chicks were IBD-infected.

For More information:
R.A.Phillips and H.M. Opitz, Dept. of Animal, Veterinary and Aquatic Sciences, University of Maine, Orono, Maine, U.S.A.

Sanitizing Hatching Eggs

Peroxidase catalyst compound (PCC) is effective as a dip to reduce shell contamination of hatching eggs.

Dip treatment with this compound has been found not to affect egg weight loss in incubation, hatchability, embryonic mortality, chick body weight gain, feed consumption, feed conversion and mortality. Levels of *salmonellae* and aerobic plate counts were reduced significantly by the compound when compared to the control. In fact, PCC was as effective as formaldehyde fumigation.

Studies are needed on spray application, spray techniques and

the most desirable formulation for maximum bactericidal effect without harm to the embryo.

For More information: Fueng-Lin Kuo, J.B. Carey, S.C. Ricke and S.D. Ha, Dept. of Poultry Science, Texas A & M University, College Station, Texas 77843, U.S.A.

Now "Anti-Cholesterol Egg"

After bio eggs and free range eggs, the latest product set to arrive in France is the Omega 3DHA egg, enriched with polyunsaturated fatty acids. Developed by two US firms, Omegatech and Nutrasweet Kelco, who claim the egg has beneficial qualities for the nervous and cardio-vascular systems, for babies and young children and for people suffering from stress-the egg is already on retailers'shelves in Belgium, Germany and Spain. Export licences have already been granted in Austria, Switzerland and the Benelux. Over 1 million of these eggs, which are similar in price to free-range eggs, have already been sold in Europe.

Chew One Chocolate A Day to Keep Cholesterol Down!

A bar of chocolate a day may actually help control blood cholesterol that can cause heart attacks, said Mr Lawrence Graham, President of the US Chocolate Manufacturers Association (CMA). Graham was revealing the "myth-dispelling" marketing messages that are helping US chocolate sales grow by leaps and bounds despite the dietary concerns of the modern American consumer.

But the work of the CMA's American Cocoa Research Institute, whose conclusions are energetically promoted by the industry through the media, schools and health organisations, also plays a big role. "in the health area, we have been working for years in identifying and evaluating issues significant to the cocoa industry", Mr. Graham said.

These included work on stearic acid, a saturated fat found in cocoa butter that has been perceived as affecting cholesterol levels and on perceived as affecting cholesterol levels and on dental cavities, migraines, caffeine, acne, allergies and obesity.

Almonds to Reduce Sugar Levels

Almonds, relished since times immemorial as dry fruits and for their health benefits, have been reported to lower blood sugar levels, a finding that may bring cheer to diabetics. Sweet almonds are used as a tonic for intestines, brain, liver and the chest, while bitter almonds are used in inflammation, headache, weakness of eyes and bronchitis. Recently, scientists at the Indian Institute of Technology (IIT), New Delhi, found that almond seeds lowered blood sugar levels by about 28 per cent at the end of two months in experimental rabbits. The factor responsible seems to be a non-oil fraction, a report by IIT scientists Sunita Teotia and Man Singh in the Indian Journal of Experimental Biology. The scientists studied the effect of entire almonds, the defatted seeds as well as its oil on blood sugar levels in rabbits. Almond seeds reduced blood sugar levels significantly -by 28 per cent- at the end of the two-month study.

The sugar lowering of hypogycemic effect was lower in defatted seeds and least in the oil portion, the scientists reported in the journal. The active principle may be a substance other than the oil of almond which is partly soluble in diethyl ether, they reported. More studies need to be conducted to isolate the factor that reduces blood sugar levels, the report concludes.

Mussel and Oyster Culture-Technology Package to Suit Indian Conditions

The recent Supreme Court judgement banning prawn culture within 500 metres from the high tide area in the coastal regions, has come as a blessing in disguise for mussel culture (shell-fish culture), which is slowly gaining momentum in the coastal districts of Karnataka.

For the fishermen, it has proved to be a better alternative for prawn culture, who till recently depended on prawn culture.

Among the cultivable groups of marine organisms-oysters and mussels have emerged as the most important ones including some leading industrialized countries. Till recently, there was no mussel or oyster production by commercial farming in India.

The Central Marine Fisheries Research Institute (CMFRI), Cochin has carried out extensive research on scientific farming of edible oyster and mussel since 1970 and has developed technology packages for oyster

and mussel culture suitable for Indian conditions.

Considering the merits of these technologies, recently few farmers in Kerala have initiated small scale production of edible oysters and mussel in estuaries of Kerala. The scope for a similar adoption of these technologies by Karnataka farmers/fishermen is bright as coastal environment in both the states are identical.

At the same time, recent experiments conducted at various places in Dakshina Kannada and Uttara Kannada districts in mussel culture have shown excellent results.

Karnataka Fisheries Development Corporation (KFDC) would be taking up open sea mussel culture on a commercial scale this year, using the technology and seeds from CMFRI.

It is planning to manufacture pickles as well as market the molluscs in frozen consumer packets.

The world production of edible oyster in 1992 was 1.07 million tonnes of which 89 per cent was through culture. The world mussel production in 1992 was estimated at 1.09 million tonnes, of which 80 per cent was contributed from farming.

South Korea, Netherlands, China, France, Spain, Japan, Italy, Denmark and New Zealand are some of the countries leading in oyster and mussel production. In India, the production is comparatively meagre, with the annual edible oyster production being only 200 tonnes and mussel production estimated at 10,000 tonnes.

There is an increasing demand for shuckled mussel meat internally. The present local cost of 100 shell-on (60-70mm) mussel is Rs.35. A number of marine products export houses have evinced interest in shell-on mussels at a rate of Rs.14 per kg.

Saline Water Improves Quality of Onion Bulbs

Onion, an important commercial vegetable, is being grown in four lakh hectares with an annual production of 4.18 million tonnes of bulbs. It accounts for 70 per cent of the vegetable exports. In the world, India is first in cultivated area, second in production next only to China and third in export after the Netherlands and Spain.

However, yield per hectare in India is quite low compared to other countries. Among the several reasons, salinity in the soil or use of saline water for irrigation for onion production is an important one.

Farmers often tend to use salinity-susceptible varieties in the absence of proper knowledge of salt tolerant varieties.

At the Indian Institute of Horticultural Research, Bangalore, field experiments were conducted in red soils of Hessaraghatta to know the effect of saline water irrigation on yield, quality and storage life of different varieties.

The following varieties were tested-Arka Kalyan, Arka Niketan and Arka Pragathi along with a check variety of Nasic Red at three levels of salinity-fresh water (0.3 dS/m), moderate salinity (2.5 dS/m) and high salinity (5 dS/m) of irrigation water.

Onion crop is generally sensitive to saline water during germination-germination percentage was 85-90 per cent at moderate salinity and dropped to 70-75 per cent at a higher level. Bulb yield was 12.4, 10.6 and 12.4 tonnes/ha in Arka Kalyan, Niketan and Pragathi in that order with fresh water irrigation.

Bulbs were stored for 90 days and storage loss in the form of unmarketable bulbs was found. It was the least in Niketan (25 per cent) followed by Pragathi (35 per cent) grown at moderate salinity. Bulbs had a good shape with minimum spoilage and weight loss under saline treated plots in case of Arka Niketan.

It is recommended that all the varieties can be grown at moderate level of saline water irrigation.

Superior Potatoes Through Genetic Engineering

Several years ago, understanding of the structure of the gene that triggers production of sucrose synthase began to suggest to researchers that this enzyme might be useful in changing plant structures. Sucrose synthase, in addition to increasing the amount of reducing sugar available from starch structures in plants, seeds, and tubers, has interesting effect on the other structures.

According to a recently published international patent application, researchers at Monsanto Co. found that potatoes with increased sucrose synthase had better cold tolerance and stored better without bruising. The impact of this breakthrough for major potato users is great: use of cold storage potatoes for the giant potato chip and French fry industries could be greatly assisted by a non-bruisable potato.

RAW MATERIALS

India's Export Potential of Agricultural Produce

India's share in world agriculture exports has been lingering at less than one per cent for many years. Though it accounts for 10 per cent of the global agricultural output, the pressure of domestic demand has been a major constraints on exports.

The share of agricultural exports in India's total exports has shown a decline over the years. From 40 per cent in the mid-70s, it has declined to about 30 per cent in 1980-81, 19.4 per cent in 1990-91 and 14.7 per cent in 1992-93, 13.4 per cent in 1994-95 before rising to 16.4 per cent in 1995-96. The fail in the share of traditional exports items like tea, tobacco, spices, sugar, etc. has added to the decline. The ratio of agricultural imports to the country's total imports has remained stagnant at below 4 per cent for the last five years, except for 1994-95, when it was 5.75 per cent.

While exports of non-basmati rice, wheat, jowar, bajra, rapeseed, mustard, sunflowerseed, pulses and raw cotton are allowed freely but within specified quantitative ceilings, edible oils (except coconut oil) have been placed under open general licence (OGL) with a reduced duty of 20 per cent. The new EXIM Policy (1997- 2002) has considerably simplified procedures for enhancing India's total exports to $ 90-100 billions within the next five years.

The total agricultural exports have risen considerably by 256.2 per cent from Rs 7901.95 crores in 1991-92 to Rs 20243.56 crores in 1995-96. Commodities like rice, spices, cashew, castor oil, oil meals, fruits and vegetables and marine products have contributed to the significant increase in the exports during 1995- 96. The exports earnings (provisional) for 1996-97(April-October), including plantation crops and marine products, has been placed at Rs 13,510 crores, a rise of 48.8 per cent over the corresponding period of the previous year. However, the decline in the growth in exports of traditional items like tea and coffee, castor oil, tobacco and pulses and the alarming rise in imports of edible oils are affecting India's trade.

India, retaining the second position in rice output after Thailand, plans to earn $812 millions through rice exports for the year 1997-98.About 90 per cent will be directed to countries like Saudi Arabia, UK, UAE, Kuwait and the USA, with exports to western Europe also encouraging.

India's non-basmati rice has market in the West African countries.

Export of wheat is permitted subject to quantitative ceilings and minimum export price (MEP). Wheat exports during 1996-97 are expected to touch 2 million tonnes due to supply agreements with South Africa, Eastern Africa, Morocco, Sri Lanka, Bangladesh, Egypt and Turkey.

The exports of tea and coffee have registered a rise of 32 percent, while tobacco rose by 75 per cent during 1995-96. Tea exports for the financial year 1996-97 is expected to touch Rs 1,200 crores (180 million kg), provided efforts are made to improve exports to Poland and the CIS countries.

One of the largest producers of oilseeds after US and China, India's major markets for oilmeal exports are the far east countries, accounting for 60 per cent of the country's aggregate oilseed exports.

While the exports of oilmeals have been steadily declining, the imports of edible oils have been increasing. For the existing growth rate of 2.2 per cent in vegatable oil as against the demand growth rate of 5.5-6 per cent per year, India incurs a foreign exchange amounting to Rs 1,800-Rs 2,000 crores to make up the demand supply gap of about 7-8 lakh tonnes.

The current failure of castor crop in Brazil and China has helped to boost India's castor oil exports, which reached 2.64 lakh tonnes in 1995-96, fetching Rs 734 crores in foreign exchange. With a rise in demand in soymeal in China and Britain for its use as an animal feed, there are good prospects for India's soymeal exports. Though soybean exports account for 70 per cent of the oilmeals export, the export of soymeal is expected to slow down during the current fiscal year due to reported shortage of soybean for crushing.

India's cashew exports are expected to cross Rs 1,500 crores in 1996-97, judging by the trend of exports for the 10 months ended January 1997, mainly in hard currency area and Russia. The Netherlands and the USA together import two-third of our cashew kernels.

India has emerged as the largest producer of fruits and vegetables. Besides major fruits which are exported such as mangoes, grapes, bananas, citrus fruits, etc. new fruits like strawberries, pomegranates, lychees and custard apple have been introduced in the

international market. There is a scope to expand India's agricultural export basket by including more horticulture items, including fresh and processed fruits, vegetables and flowers.

Exports of mushrooms and food preparations have a substantial growth potential in the far east market particularly Japan, Hong Kong, etc. The reduction of duty on capital goods and doing away with excise duty on processed fruits and vegetable products has helped to improve capacity utilisation. The share of fruits juices and pulp, though negligible 0.64 per cent, has tremendous growth potential of about US $ 8.9 billion in the international markets.

On the spices front, the export target has been 1.96 lakh tonnes, valued at Rs 824 crores for 1996-97. Against this, exports upto October, 1996 has been 61 per cent in quantity and 68 per cent in value.

The export of pepper, chillies, mint oil, spice oil and oleoresins which together accounted for 75 per cent of the total spices export earnings, have exceeded the target in value terms and in volume. The exports of ginger, turmeric, coriander, too exceeded previous year's figure.

On the pulses front, however, India is forced to depend heavily on imports.

India's Export Potential of Grapes

India has the distinction of recording the highest per hectare yield of grapes. Yet it ranks a poor seventeenth with only 1.33 per cent of the world production.

Experts feel that there is a great scope for growth in exports as Indian varieties are of premium quality. At present, exports account for 0.6 per cent of world trade of 16 lakh tonnes valued at US $1.9 billions.

India exports mainly to the United Kingdom, the United Arab Emirates, Saudi Arabia, Bahrain, Kuwait, Oman and Bangladesh. Recently, the European Union has also opened up.

More than 90 per cent of the country's grape areas are in Maharshtra, Karnataka, Andhra Pradesh and Tamil Nadu, representing the largest areas of grapes grown under tropical conditions in the world.

Keeping in view the climatic conditions, NABARD has identified the areas that can be developed as growth centres for export of high quality grapes. These are the Nasic-Pune-Sangli , Hyderabad-Ranga Reddy and Bangalore-Kolar-Bijapur regions.

The demand is for berries of large size, with firm pulp, seedless, well-balanced acid-Brix ratio and uniform colour. Good physical condition is imperative in that they can't be shrivelled, sun-burned, crushed or decayed. They should be free from damage by pests, diseases and chemicals.

All the principal varieties grown in the country, Anab-e-shahi, Thompson seedless, Tas-a-Ganesh, Kishmish Charni, Sharad Seedless, Bangalore Blue and Gulabi, have a high yield. Improvement of quality is crucial for capturing external markets.

What is required is a slow shift to better production, storage, packaging and transportation technology. In the traditional method, grapes are packed in wooden crates and despatched by air. The freight cost alone in this case is Rs 75 per kg.

A better method is to pack the grapes in state-of-the art reefer containers after pre-cooling and transport by ship. The freight cost in this case is Rs 14-16 per kg. The pre-cooling ensures desired temperature and moisture and improves the shelf-life of grapes by at least 50 per cent.

A network of storage and cooling facilities near farms, shipping ports and airports would radically improve shelf life. Fully ripe grapes have shelf life of only 3-4 days under ambient conditions, whereas grapes stored at two degree centigrade in pre- coolers can stay for three to four months.

Grapes packed in grape guard paper with perforations for proper aeration command a price between 10 and 18 pound sterling for every five kg pack at reputed departmental stores like Marks and Spencers Europe.

Another problem that exporters face is the small size of farms in India, varying from one to four acres. They are, therefore, unable to standardise quality with regard to size, taste, colour and flavour.

Pre-harvest factors that have a direct bearing on production of export quality grapes are selection of suitable area, varieties, judicious use of nutrients and pesticides, pruning and irrigation.

Of the total world production of 56.39 million tonnes of grapes, India produced about 6.7 lakh tonnes in 1994. Present global production is about 100 million tonnes, but India's share has not improved. As per NHB's production book, India's productivity under grape was 20.5 tonnes per hectare which occupies the first place among other countries.

AWARDS

Prof. V.Subrahmanyan Industrial Achievement Award-1996

Dr M. Mahadevaiah, Head, Food Packaging Technology Department, CFTRI, Mysore was awarded the prestigious **Prof: V.Subrahmanyan Industrial Achievement Award-1996** during the Annual Convention of AFST(I) (ICFoST-97) held at Bhabha Atomic Research Centre, Mumbai on 25, September 1997. The award was presented to him by Mr Ramesh Chauhan, Chairman, Parle Exports Ltd., Mumbai, on behalf of the Association of Food Scientists and Technologists (I) for his outstanding contributions to the all round development of Food Processing and Packaging Industries in India.

Dr M. Mahadeviah receiving the Prof: V.Subrahmanyan Industrial Achievement Award from Mr Ramesh Chauhan, Chairman, Parle Exports Ltd,.

AFST(I) FELLOW Award-1996

Dr G.A. Ravishankar. Head, Plant Cell Biotechnology Department, CFTRI, Mysore was honoured with the title **"Fellow AFST"** during the Annual Convention of AFST(I) ICFoST-97, held at Bhabha Atomic Research Centre, Mumbai, on 25, September 1997. The honour was bestowed upon him by Mr Ramesh Chauhan, Chairman, Parle Exports Ltd., Mumbai on behalf of the Association of Food Scientists and Technologists (I) for his significant contributions in the area of plant cell biotechnology, leading to the development of processes for food colours and food flavours through plant cell cultures.

Dr G.A. Ravishankar being honoured with title 'Fellow AFST' by Mr Ramesh Chauhan, Chairman, Parle Export Ltd,.

Prof. Brij Kishore Mital, Professor, G.B.Pant University of Agriculture & Technology, Pantnagar was honoured with the title **'Fellow AFST'** in recognition of his significant achievements in the area of Food Science and Technology.

Dr Jagadish Sarvotham Pai, Director, University Department of Chemical Technology, Matunga, Mumbai was honoured with the title **"Fellow AFST"** in recognition of his significant achievements in the area of Food Technology and Industrial Biotechnology.

Dr (Ms) R. Rugmini Sankaran, Former Director, DFRL, Mysore was honoured with the title **"Fellow AFST"** in recognition of her significant contributions in the area of Food Science and Food Microbiology.

Laljee Godhoo Smarak Nidhi Award

Dr (Ms) Indirani Karunasagar, Associate Professor, Fisheries College, Mangalore was given the **"Laljee Godhoo Smarak Nidhi Award-1996"** in recognition of her significant contributions in the field of fisheries. Her work in the area of fish and shrimp disease management led to the development of aquatic vaccines against fish pathogen *Aeromonas hydrophila*.

Young Scientist Award-1996

Dr Sudhakar Johnson, R&D. Scientist, Dabur Research Foundation, Ghaziabad won the **"Young Scientist Award-1996"** in recognition of his significant achievements in the area of Plant Cell Biotechnology.

Best Student Award-1996

Mr J.S. Marahar, Student, MSc(Food Technology) CFTRI, Mysore was presented with the **"Best Student Award-1996"** for his outstanding academic achievements.

Best Paper Award-1996

Journal of Food Science & Technology

Dr P. Vincent Monteiro, Dr K. Sudhindra Rao and Dr V. Prakash won the **'Best Paper Award-1996'** for their research paper entitled "*In Vitro* Interaction of Groundnut Protein with Aflatoxin B_1" published in the *Journal of Food Science & Technology* Vol 33, No.1, pp 27-31.

Best Feature Article Award-1996

Indian Food Industry

Dr Raghunandan, Mr Purkayastha and Dr Vinay Dharmadhikari won the **"Best Feature Article Award-1996"** for their feature article "Application of Electronics and Computers for Small Scale Processing Industry" published in *Indian Food Industry* Vol 15, No.1, pp 18- 28.

Placement Service in Food Processing Industries in India

CPF, Centre for Processed Foods, Bangalore, India, a non-profit, non-government organisation with a mission to work towards the development of a strong and modern food processing industry are pleased to provide placement services for professionals at various levels (Fresher, Junior level, Middle level, Senior Executives and very Senior Executives) in food processing industries in India.

Individuals and industries who wish to utilise this service shall contact the below said address for details. Confidentiality will be strictly maintained.

Director
Centre for Processed Foods,
P.B. No. 8058,
Sadashivnagar Post,
Bangalore-560 080.

Our New President

Dr. S. S. Arya

President, AFST (I) for 1997-98

Dr S.S. Arya, Director, Defence Food Research Laboratory (DFRL), Mysore has taken over as President AFST(I) for the year 1997- 98.Dr Arya has made valuable original contributions in the fields of fats and oils, food additives and colourants, food flavours, cereal processing and convenience foods. His work on preservation of *chapatis* in the ready-to-eat form, formation and degradation of flavouring compounds in *chapatis*, role of lipids in flavour generation in foods and interactions of sorbic acid in foods has earned him a name for himself. Colour plays a very important role in the consumer acceptance of foods. Dr. Arya's work on carotenoids and anthocyanins in foods, the role of water activity, metal ions, lipids and other food constituents has led to better understanding of mechanism of their degradation and has enabled process development for their stabilisation and food quality enhancement.

Dr. Arya has always believed that without indigenisation and without attending to the food needs of vast middle class consumers in this country, food industry cannot grow. To achieve this objective, he has persistently investigated various methods for developing ready-to-cook and ready-to-eat foods of Indian cuisine. He has successfully developed more than 20 processes for instant cooking foods of Indian cuisine. These products require mere mixing with hot water for cooking and are comparable to instant products developed anywhere in the world. More than 15 process technologies developed by Dr. Arya are commercially utilized by food processing industry.

Dr. Arya has been solely responsible for establishing technology transfer extension services and training facilities at DFRL, Mysore and has been mainly instrumental in successfully transferring the know-how of about 40 technologies to the industry.

Dr. Arya has made very valuable contributions in the designing of Operational Pack Rations for Indian Armed Forces, the prominent among these are rations for Indo-Soviet Space Mission, Antarctica Expeditions, Compo Pack Ration and Survival Rations for Army, Navy and Air Force. He has also made notable contributions in the development of standards and analytical methodologies for quality assurance programmes and he is Chairman/Member of various national committees.

He won the Prof V. Subrahmanyan Industrial Achievement Award instituted by AFST(I) in the year 1992, besides winning many other awards to his credit. He is the 'FELLOW' of the AFST(I). Dr Arya is a high calibre scientist with many years of administrative experience. Therefore, his tenure as President of AFST(I) is bound to bring in an era of significant changes in upholding the high ideals of the Association.

Members of the Central Executive Committee, Advisors/Editors of *Indian Food Industry* / Subscribers, AFST(I) Members / Fellows warmly congratulate Dr.S.S. Arya on his assumption of the office of the President AFST(I) and wish him all success in his endeavours to lift the Association to still greater heights.

BOOKS

"Major Spices of India - Crop Management Post- Harvest Technology"

Author: Pruthi, J.S.

[Published by Indian Council of Agricultural Research, Publication and Information Division, Krishi Anusandhan Bhavan, Pusa, New Delhi - 110 012, First Edition , 1993. pp xxii + 514. Subsidised Price : Rs. 200/-]

India occupies the place of pride since time immemorial in the production and export of spices. Spices production, processing and trade now have a prominent role in the national economy, as they provides employment to millions of rural people and earn substantial foreign exchange to the country. Of late, there is a substantial increase in the production of spices. It is estimated that the present production of spices is around 25 lakh tonnes per annum. Spices exports have also shown a remarkable improvement in recent years. During 1995-96, the country earned Rs 785.89 crores as foreign exchange through the export 2,02,197 tonnes of spices, but during 1996-97, she earned about Rs 1260 crores (Rs, 12,000 millions). Considering the demand in domestic consumption and export and annual growth rate of 10 per cent in the production and 15-30 per cent in the export is envisaged during the Ninth Plan period. It, is therefore, imperative to increase the production and productivity, diversify the spice processed value-added products and improve the post-harvest technology for quality upgradation. The present book written by Dr J.S. Pruthi with 52 years of meritorious professional experience, bedecked with several honours and awards in Food and Spice technology, is very timely and relevant in this context.

This book covers all aspects of the five major spices of India viz., black pepper, cardamom both small and large, chillies or capsicums, ginger and turmeric, which together account for 70-85% of the annual export earnings by India. This comprehensive compendium consists of 8 distinct chapters; the first is an Introductory chapter and the next 5 chapters cover in detail the 5 major spices, the 7th chapter deals with quality control and national and international standards for species and spice products and the eighth chapter highlights the future avenues on spices research and development. The book is complete with 17 exhaustive and very useful annexures. It carries a forward by no other expert than Dr N.S. Randhava, the then Director-General of Indian Council of Agricultural Research (ICAR), who states that this publication is unique and the first of its kind in India and possibly in Asia.

The Introductory chapter covers the classification of spices and condiments; it also briefly describes the History of Spices development in India, the role of the different agencies concerned with the research and development of spices like the ICAR and its Institutes like Indian Institute of Spice Research (formerly National Research Centre for Spices (NRCS), Calicut. All India Coordinate Research Project on Spices (all under ICAR); Central Food Technological Research Institute, Mysore (CSIR), Indian Spices Development Council, (Ministry of Agriculture, Govt. of India) Directorate of Cocoa, Arecanut & Spices Development, Spices Board etc. It also covers all the International Organizations like ISO, etc dealing with spices, trend in world spice trade, present status of spices industry in India and hints on future plans for spices development in India.

The five major spices have been dealt with in detail in five separate chapters covering all aspects of the commodities such as description, distribution, package of practices, including plant protection, harvesting and economics of cultivation. Besides, Post-harvest Technology, Processed product diversification and their uses have been given special importance, utilizing the author's own vast knowledge and experience (over 40 years) in these areas. The author has taken special care to collect as much information as available in respect of each major spice covered. At the end of each chapter, select bibliography has also been given, which is very useful to the students and research workers alike.

While describing the distribution of pepper cultivation, the non-traditional areas have, however, not been mentioned. For instance, pepper cultivation is now initiated in several States like Andhra Pradesh, Orissa, West Bengal, North Eastern States and A&N Islands though the official estimates on area and production of spices in such new areas are not yet available. The first hybrid variety "Panniyur-1" has been described as disease- resistant in one context, which is not correct. Useful salient features of all the newly released varieties of the five major spices along with the names of the Institutes which developed

the new varieties, have been given. An added advantage of the book is the description given step-by-step on the latest spice curing methods with illustrations and spice grading procedures both for the internal trade and export, which are very useful to both farmers and spices traders.

The chapter on "Quality control and National and International Standards", describes AGMARK grade specifications and also quality standards as laid down under the Prevention of Food Adulteration (PFA) Act and Rules and Development of International Standards (ISO) and the related methods of tests in respect of the whole and ground spices and their products. The last chapter regarding"Future Avenues of Spices Research and Development" contains valuable recommendations for increasing both their production and productivity, improving their quality and bringing down the cost of production thereof, etc.

An interesting aspect about the book is that it meets the requirements of all concerned with spices industry, the students, research and extension workers, farmers, processors, traders and quality control monitoring administrators, etc. From the practical point of view, this book is quite different form the earlier books written by the same author and so far, such a publication covering all aspects of the major spices is not available in India and possibly, Asia. The author, Dr J.S. Pruthi, is an internationally well known authority in food science and technology with over 52 years specialization in spices and fruit technology. He is already the author of 8 technical books. Some of his outstanding publications and patents have won him numerous National and International awards. It is worth while to keep a copy of this valuable book by all concerned with the spices industry. This book is also moderately priced. Having been subsidised by ICAR and as such, it should find a place on the shelves of all the 33 Agricultural Universities in India. In fact, the book could be recommended as a text book for graduates & P.G. students of these Agricultural Universities.

E. Velappan,
(Retd.) Director,
Directorate of Cocoa, Arecanut
& Spices Development,
Ministry of Agriculture, Govt. of India.

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The Lecithin people

Lucas Meyer GmbH, Hamburg
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Lucas Meyer GmbH
Ausschlager Elbdeich 62, 20539 HAMBURG
Fax : 0049 40 789 8329, Tel :0049 40 789 550

Kancor Flavours and Extracts Limited
Bazar Road, Mattancherry, COCHIN.
Fax : 0484 225844 Tel : 225434/3551/3661
Email : kan.cor@gems.vsnl.net.in

TRADE FAIRS & GET-TOGETHERS

Conference on Spices and Medicinal Plants

A National Conference on " Recent Trends in Spices and Medicinal Plant Research" and 7th Annual meeting of the Academy of Plant Sciences India will be held from 2 to 4, April 1998 at Calcutta. This is being organised by the Academy of Plant Sciences, India in collaboration with Spices Board. Chemistry and bioactivity of natural products, oleoresins, aromatics, natural flavouring and colouring substances, medicinal properties of spices, preservation, processing and trade of spices and medicinal plants, genetic stock identification, biodiversity and conservation, productivity and cultivation, micropropagation, production of secondary metabolites in tissue culture, spices and medicinal plants in ayurvedic, unani, folk and tribal medicine, spices and medicinal plants in rural economy and export market, collaboration, IPR and gene patenting are the topics to be covered.

For further details, contact

Dr. Amit Krishna De

Organising Secretary

National Conference on RTSMPR

35, Garpar road

Calcutta-700 009

BakeryAsia 98

BakeryAsia 98, the 3rd Asian International Exhibition of Equipment and Supplies for the Bakery and Confectionery Industries, will be held from 14-17 April 1998 at Singapore Suntec Centre, Singapore.

The Spanish Catering Equipment Manufacturers Association (FELAC) is exhibiting for the first time and it has taken up a 200 m^2 booth. Sottoriva of Italy, Seewer Rondo of Switzerland, Purtos with its Belgian pre- mixes, Konig bakery machinery from Austria and the French oven manufacturer, Eurofours are some of the companies, who will participate.

In recognition of the significance of Asia's cosmopolitan tastes for baked goods, a number of the exhibitors will be presenting bespoke equipment and ingredients tailored to satisfy both western and oriental demands.

Organisers:

Singapore Exhibition

Services Pte Ltd

2 Handy Road

#15-09 Cathay Building

Singapore 229233

Tel: (65) 338 4747

Fax: (65) 339 5651

e-mail: into @ sesmontnet.com

Food and Hotel-Asia 98

Food and HotelAsia 98 is recognised by South East Asia's most influential bakery, hospitality and food groupings including the Singapore Tourist Promotion Board, Thai Hotels Association and many more Associations connected with the Industry.

Food & HotelAsia 98 is also recognised by the Singapore Trade Development Board and the Singapore Exhibition & Convention Bureau under the Approved International Fair (AIR) Scheme. In addition, Food & HotelAsia 98 has been accredited by the Union des Foires Internationals (UFI), a Paris-based international association of trade fair organisers which awards exhibitions of high quality, high international content and good track record.

Further information:

Greg Marucchi

Overseas Exhibition Services Ltd

11 Manchester Square

London

WIM 5AB

United Kingdom

Tel: +44 (0) 171 486 1951

Fax: +44 (0) 171 413 8210

e-mail:bakery@montnet.com

Food & Hotel Africa'98

Food & Hotel AFRICA' 98 will be held from 23-26, August 1998 at Gllagher Estate, Johannesburg, South Africa. This is the 2nd African International Exhibition of Food and Drink, Restaurant and Catering equipment, Supplies and Services. Products on show will include hotel and restaurant supplies, bakery equipment and tableware.

For more information:

Maria Hook, Specialised Exhibition (P) Ltd

Cnr. Northern Parkway and Handel Road,

Ormonde

Johannesburg 2091, South Africa

Tel: +27 (0) 118351565

Fax: +27 (0) 11496 1161

email: Specialx@kon.co.za

Continued on page 60

AFST(I) NEWS

ICFoST-97 and Annual General Body Meeting (1997)

The Association of Food Scientists and Technologists (India), Mumbai Chapter organised the Indian Convention of Food Scientists and Technologists (ICFoST-97) jointly with the Food Technology

Division, Bhabha Atomic Research Centre (BARC), Mumbai during September 25-26, 1997 at the Multipurpose Hall, BARC Guest House, Anusakthinagar, Mumbai-400 094. The focal theme of the Convention was "Emerging Trends in Indian Food Industry in the 21st Century".

Inaugural Session

It was held under the Presidentship of Mr. Anil Kakodkar, Director, BARC. Over 500 delegates participated in the Convention. Dr. H.R. Adhikari Vice President(Mumbai Chapter) welcomed the delegates. Dr. C.L. Nagarsekar, President, AFST(I) briefed the delegates on the theme of ICFoST-97.

The function was inaugurated by Dr. V. Prakash, Director, CFTRI, Mysore. Mr Ramesh Chauhan, Chairman, Parle Exports was the Chief Guest and he gave away the various awards and conferred the title "Fellow AFST on 4 distinguished perosonalities".

AFST(I) Awards

The main event of the inaugural session was the presentation of AFST(I) Annual Awards by the Chief Guest, Mr. Ramesh Chauhan. Dr. M.S. Krishnaprakash, Hon. Secretary, AFST(I) briefed the distinguished gathering about the various awards instituted by AFST(I) and read the citation of the recipients. **(See details on pp 52, 53)**

Technical Sessions

There were 6 sessions. The Technical Session I on "Emerging Trends in Indian Food Industry in the 21st Century" was chaired by Prof. D.V. Rege, Ex-Director, UDCT, Mumbai. Dr. D.H.Pai Panandikar spoke on "Emerging Trends in Indian Food Industry, while Dr. S.S.Arya, Director, DFRL, Mysore presented a paper on "Traditional Foods-Emerging Trends".

The Technical Session II on "Marketing Strategies" was held under the Chairmanship of Mr. Ashish Mitra, Managing Director, ITC Agro-Tech. Ltd. The first speaker was Mr. Jagdeep Kapoor on the topic "Marketing of Food Products to Indian World Class Customers' followed by Ms. Rama Bijapurkar, Marketing Consultant who spoke on "Marketing Strategies".

The Technical Session III on "Impact of Globalization of Food Industry" was chaired by Mr. R.K. Bansal, Director, FPO, Ministry of Food Industries, New Delhi. There were 3 papers in this session. Ms. Ireena Vittal, McKinley & Co. Inc., presented a paper on "FAIDA-Modernising the Food Chain". Mr.Shrikant Gupta, Marico Industries, presented a paper on "Impact of Globalization - Perspective of Indian Food Industry", while Mr. F.J. Dastoor, Chairman, Acumun Management Services spoke on "Challenges and Opportunities in the Food Industry Over the Next 10 years".

The Technical Session IV on "Food Laws" was held on September 26, 1997, under the Chairmanship of Prof. J.S.Pai, UDCT, Mumbai. There were 3 main speakers. Mrs. Debi Mukherjee, Asst. Director- General, PFA, spoke on "Food Safety and Food Quality Control in India". Dr. A.S. Aiyar, Director, Centre for Processed Foods, Bangalore dealt with "Impact of Legal, Technical, Economic and Societal Factors on Food Safety" and Dr. Huaying Zhang, Coca-Cola Ltd., presented a paper on 'Risk Assessment and Food Safety Control".

The Technical Session V was on "New Technologies/New Ingredients" and spread into 2 parts. The first part dealt with "Food Irradiation". It was chaired by Dr. P.C. Kesavan, Director, Bio-Sciences Group, BARC, Mumbai. Two speakers viz., (i) Dr. Paul Thomas, Head, Food Technology Division,BARC, spoke on "Food Irradiation - a Technology for 21st Century" and (ii) Dr. V.K.Iya, Former Director, Isotope Group, BARC dealt with "Radiation Technology - the Emerging Science. The second part was on "Functional Food Ingredients". This was conducted under the Chairmanship of Dr. V.H. Potty, Chairman, Diversified Food Technologies (India), Mysore. There were 4 speakers. Mr. Abbott Chong, FMC read a paper on "Development of Texture in Foods - Scope of Additives". Mr. V.P.Iyer, Bums Phillips India Ltd., spoke on "Additives for Bread", Dr. Charley Ponti, Global Food Innovation, Switzerland spoke on "Micromilled

Soya Powder - a Functional Food". Mr. Ketan Trivedi presented a paper on "Balancing the Indianization and Globalization of Functional Food Ingredient".

The session VI was consisted of 'Panel Discussion", chaired by Dr.C.L. Nagarsekar, President, AFST(I).

The sessions ended with a valedictory function.

Annual General Body Meeting

The Annual General Body Meeting of AFST(I) was held on 26, September 1997 at the same venue in Mumbai 5.30 pm. The President, Dr. C.L. Nagasekar welcomed the members.

Dr. M.S. Krishnaprakash read the Secretary's report. In his report, he presented the various activities, progress and achievements of the AFST(I) and various chapters during the year 1996-97.

Sri. Baldev Raj, Hon. Treasurer, AFST(I) presented the audited statement of accounts. He also presented the budget proposals of AFST(I) and AFST(I) Education and Publication Trust for the year 1997-98. The General Body approved both the reports and the budgetary proposals.

Announcement of Election Result

The Secretary then announced the result of the election held for the post of President-Designate. The others were elected without contest. The following are the office-bearers of the Association for the year 1997-98.

1. President-Designate :

Prof. G.S. Chauhan (Pantnagar)

Vice-President (H.Q.) :

Mr. N. Keshava

Vice-Presidents (Chapters) :

Dr. H.R. Adhikari (Mumbai)

Dr. S.B. Maini (New Delhi)

Mr. N.P. Kawale (Hyderabad)

Dr. Dheer Singh (Patnagar)

Joint Secretary :

Dr. A.D. Semwal (Mysore)

Hon. Treasurer :

Mr. N. Manjunath (Mysore)

In addition to the above, the President : Dr S.S. Arya, Immediate Past- President Dr. C.L. Nagarsekar : Hon. Executive Secretary Shri. Rajesh C Matche; Immediate Past-Secretary Dr. M.S. Krishnaprakash; Editor-in-Chief, JFST, Dr. B.K.Lonsane and Chief Editor, IFI Dr. Richard Joseph will form the members of the Central Executive Committee for the year 1997-98.

The outgoing President Dr.C.L. Nagarsekar welcomed the members of the new CEC and inducted Dr. S.S. Arya to the chair of President of AFST(I). Dr. Arya acknowledged with gratitude the confidence reposed on him by the members of the Association. He promised to do his best to further enhance the reputation of the Association during his tenure. Dr. A.S. Gholap, President, Mumbai chapter, AFST(I) proposed a vote of thanks.

Chapters' Activities

Bhopal Chapter

World Food Day Celebrated

The Association of Food Scientists and Technologists (I), Bhopal chapter celebrated World Food Day in collaboration with Central Institute of Agricultural Engineering at (CIAE) campus, Nabibagh, Bhopal on 16th October. The function was attended by over 150 participants representing different organizations, colleges and schools. Several programmes like painting, elocution, eassay, quiz and recipe competition were organized for school and college students, housewives and general public. The technologies developed at CIAE., like production of soymilk and *paneer*, processing technologies and equipments for agro products like fruits and vegetables, cereals, pulses and oilseeds were demonstrated to participants on this occasion. Also, the food products developed at the Institute like ginger-candy, ginger-powder, spices, soy-biscuits, *paneers* and soy-based *gulabjamun* etc were distributed and sold to the public for their popularisation. Apart from the representation of organizations like, CSIR, Food and Drug Administration, Save Grain Campaign, and many educational institutes, several food scientists, engineers and medical specialists also participated in the activities.

The concluding function was presided over by Dr. M.S. Virdi, Project Officer, Polytechnology Transfer Centre (CSIR), Bhopal and Dr. S.C. Nandi was the guest of honour. The chief guest stressed the need of providing nutritious food to poor and commended the role of soybean in nutritional improvement. This programme was compered by Dr. Krishna Jha, Sr. Scientist of the Institute. Dr. S.D. Kulkarni, Hon. Secretary, AFST(I), Bhopal chapter and Head, Agro Processing Division, CIAE informed the house that the purpose of organising this activity was to emphasize the necessity of saving food resources for making available to needy people. He thanked specially the Director, CIAE for encouragement and support for organising this activity. The programme ended with

thanks to guests and participants.

Pune Chapter

The Association of Food Scientists and Technologists (India) Pune chapter celebrated Founder's day on 16th September 1997 at the M.S. Institute of Hotel Management and Catering Technology.

Mr A.S. Kulkarni, Manager (Projects and Assembly) Process Machinery Group of Mather & Platt (I) Ltd., Chinchwad, Pune was the chief guest. Ms Smita Bhave, Hon. Secretary welcomed and introduced the chief guest to the audience. The chief guest lighted the lamp to mark the occasion and delivered a lecture on " Different processing lines" developed by Mather & Platt (I) Ltd. Ms. V.A. Gangolli, President, Pune chapter gave the profile of the founder, Dr V. Subrahmanyan. The programme was attended by the members by the Pune chapter and also students attended of SNDT University, Mumbai.

Mrs. M.Oka, Hon. Treasurer proposed a vote of thanks.

Nominations

TRADE FAIRS & ..... Continued from page.57

New Bali Hospitality Exhibition and Conference

The first Food, Hotel Tourism Bali Exhibition & Conference 98 will be held from 5-7 March 1998, at the NUSA Indah Convention Centre in Bali, Indonesia. In addition to a major international exhibition of food and hotel equipment, it will feature a brand new conference concept with the theme of "Eco Tourism and Environmentally Friendly Hotel Development and Management Techniques".

The exhibition will be similar in profile to other Food & Hotel industry events in Asia, with exhibits from all over the world which will include foods, beverages, hotel and catering equipment of all kinds. All of the exhibit area at the Nusa Indah exhibition complex will be used for displays by over 150 exhibiting companies including large group pavilions from the USA and Australia.

More information can be obtained from:

The Worldwide Co-ordinators
Overseas Exhibition Services Ltd
11 Manchester Square
London, W1M 5AB
UK
Tel: 44(171) 486 1951
Fax: 44(171) 413 8222

IBC's International Conference

IBC's International Conference on Transgenic Plants

Advances in Value Added Plant Technology & Commercialization, will be held at Renaissance Washington DC Hotel Washington, DC from February 23-24, 1998.

For particulars contact:-
IBC conferences Inc
458, Park Avenue,
Worcester MA
01610-1227 USA.

OTAI-EXPO'98- An Exhibition of Oil Technologists Association of India

OTAI-EXPO is the exhibition of Oil Technologists Association of India organised once in 2 years by COTEX (Consumer Trade Expositions)

The next OTAI EXPO 98, will be held at the Taj Mahal Hotel, Lucknow from 13th Feb to 15th Feb 1998.

The highlight of the event is the International Seminar with the theme, "World Scenario in Oils, Oleo Chemicals & Surfactants Industries", where more than half a dozen, foreign speakers and half a score of Indian speakers will be delivering lectures. About a thousand delegates, professionals from the oil extraction field in India are expected to attend.

For details, contact :
Dr. R.P. Singh, Organising Secretary,
International Seminar & EXPO'98,
OTAI Head Quarters, HBTI,
Kanpur-208 002. India.
Tel : 91-512-541067/91-512-548204
Fax : 91-512-542849/91-512-545312

or

Mr. M.K. Janardan
Convenor-Exhibition Committee
C/o. Japro Engg. Pvt. Ltd.
206, Neelam, Sea Face Rd.,
Worli, Mumbai-400016.
Tel : 91-22-493 9434/493 8202 /495 2129
Fax : 91-22-495 0440

Invited for Fellows of AFST(I) for 1997

The Association has pleasure in inviting nominations from persons to be conferred as "Fellow of Association of Food Scientists and Technologists (India)" (FAST) to honour those who have contributed significantly to the progress of Food Science and Technology.

General

1. The awardee will be called as Fellow of Association of Food Scientists and Technologists (India) and in an abbreviated form as FAFST.

2. The total number of Fellows of the Association will not exceed 5% of the total membership, including regular and life members of the Association, in any given year or 100, whichever is lower.

The title of "Fellows" has so far been awarded to 37 AFST(I) members and 6 non-members who have contributed to the progress of Food Science and Technology.

Eligibility

1. The aim is to honour persons of outstanding merit who have contributed significantly in the field of Food Science and Technology including R&D, Product/Project Development, Industry, Transfer of Technology and Marketing. The merit of contribution should be the main criterion.

2. Among the Fellows to be nominated every year, 70% will be from AFST(I) and remaining 30% may be from non-members who have contributed significantly for the development of Food Science and Technology.

Nominations

1. The nomination for Fellow should be proposed by five AFST(I) members of good standing for a minimum of 5 years or by 2 Fellows of the Association. This is applicable to AFST(I) members as well as non-members.

2. Any regular or life member of AFST(I), who has been continuously a member of the Association can sponsor the nomination to only one Fellow in a particular year.

3. The nomination shall be accompanied by acceptance of the person proposed.

4. The nomination shall be in the format given overleaf. A brief bio-data of the nominee, highlighting the Scientific or Technological achievements in the area of Food Science and Technology, supported by a list of publications not exceeding 10 important research papers or other supporting documents not exceeding 20 pages, must accompany the nominations.

5. Central Executive Committee Members of AFST(I) are not eligible to be nominated as Fellows.

6. The nomination duly proposed and accepted by the nominee shall be sent to the Hon. Executive Secretary, AFST(I) by **31st March 1998**.

Selection of Fellows

The nominations received will be placed before an Expert Committee, appointed by the CEC for suitable recommendations to CEC each year. CEC by majority decision will finalise the names of Fellows for each year. **The decision of CEC in this matter will be final.**

Privileges of a Fellow

The Fellow shall be entitled to the following rights :

1. The awardee will be entitled to add FAFST after his name as short title.

2. To be present and vote at all general body meetings.

3. To propose and recommend the candidates for Fellow of the Association.

4. To receive *gratis* copies of one of the publications of AFST(I).

5. To fill any office of the AFST(I) duly elected.

6. To be nominated to any committee of AFST(I).

7. To offer papers and communications to be presented before the meeting of the Association.

8. The title will remain for life time of the member.

Cessation of Fellow

1. Any Fellow may withdraw his/her title of the Association by signifying his/her wish to do so by a letter addressed to the Hon. Executive Secretary, AFST(I), which will be placed before the CEC for acceptance.

2. If the Association comes to know of any activity prejudicial to the interest and well being of the Association, the CEC will have the right to withdraw the title.

Conferring as Fellows

The Fellow will be conferred with a Citation at the time of AGBM or at any other suitable function of the Association.

The Association may invite some Fellows, nominated each year, to deliver special lectures in the area of their specialization either at the AGBM or any other function arranged by the AFST(I).

Please forward your nominations duly filled as per the format given overleaf and mail it by Registered post to the Hon. Executive Secretary, AFST(I), CFTRI Campus, Mysore-570 013, before **31st March 1998**.

The envelope containing the nomination along with the bio-data and contribution (6 copies) should be superscribed **Nomination for Fellow AFST(I).**

Rajesh S. Matche
Hon. Executive Secretary

Nomination Form for Fellows of AFST(I)

We, the following members of AFST(I) wish to propose

Full name and academic distinction

FULL NAME

DATE OF BIRTH

AREAS OF SPECIALIZATION

ACADEMIC QUALIFICATIONS

for election as Fellow of AFST(I). We append below the statement of his/her claims for election as Fellow and certify that in our opinion he/she is fully qualified for that distinction. We also certify that he/she has been informed of the obligations attached to the fellowship of the AFST(I) and is aggreeable to abide by them, if elected.

Statement of the proposer (not to exceed 100 words) setting out the discovery, invention or other contribution to newer or process/products or the industrial development of the knowledge made by the nominee.

.....

Seconder's name & signature

Date :

Station :

Proposer's name & signature

Date:

Station :

(Signature of supporters from personal/general knowledge)

(1) (2) (3)

I agree for the above nomination

(Name & Signature)

.....

Note :

(1) **Six copies** of the candidate's bio-data and list of important scientific publications not exceeding 10 pages and one set of reprints or supporting documents not exceeding 20 pages shall be attached to this form.

(2) Additional information that would be of assistance in considering the nomination may be supplied on separate sheet.

(3) Last date for receipt of nomination at the office is **31st March 1998.**

Nominations for AFST (I) Awards for 1997

Nominations for the following awards of the AFST (I) for the year 1996 are invited. All nominations should be sent by Registered Post, so as to reach Honorary Executive Secretary, Association of Food Scientists and Technologists (India), CFTRI Campus, Mysore-570 013, before **31st March 1998**.

Prof. V. Subrahmanyan Industrial Achievement Award

The guidelines for the award are :

(i) Only Indian nationals with outstanding achievement in the field of Food Science and Technology will be considered for the award.

(ii) The nominee should have contributed significantly to the enrichment of Food Science and Technology and the development of agro-based food and allied industries in India.

(iii) The nominations duly proposed by a member of the Association must be accompanied by the bio-data of the nominee, highlighting the work done by him/her for which he/she is to be considered for the award.

(iv) The awardee will be selected by an expert panel constituted by the Central Executive Committee of the Association.

(v) Central Executive Committee Members of AFST(I) are not eligible to apply for the award during their tenure.

The envelope containing the nominations, along with bio-data and contributions **(six copies)** should be superscribed **Nomination for Prof. V. Subrahmanyan Industrial Achievement Award 1997.**

Laljee Godhoo Smarak Nidhi Award

The guidelines for the award are :

(i) The R&D group/person eligible for the award should have contributed significantly in the area of Food Science and Technology in recent years, with a good standing in his/her field of specialization.

(ii) The nominee(s) should be duly sponsored by the Head of the respective Scientific Institution and the application for this award should highlight complete details of the contributions made by the nominees and their significance.

(iii) The nomination duly proposed by a Member of the Association must be accompanied by the bio-data of the nominee.

(iv) Central Executive Committee Members of AFST(I) are not eligible to apply for the award during their tenure.

The envelope containing the nominations along with bio-data and contributions **(six copies)** should be superscribed **"Nomination for Laljee Godhoo Smarak Nidhi Award 1997.**

Best Student Award

The award is to be given to a student having a distinguished academic record and undergoing the final year course in Food Science and Technology in any recognised University in India. The aim of the award is to recognize the best talent in the field and to encourage excellence amongst the student community.

The guidelines for the award are :

(i) The applicant must be and India national.

(ii) He/she must be a student of one of the following courses :

(a) M.Sc (Food Sciences/Food Technology)

(b) B.Tech., B.Sc. (Tech), B.Sc.(Chem.Tech) with Food Technology specialization.

(iii) He/she should not have completed 25 years of age on 31st December 1997.

Heads of the Department of Food Science and Technology in various Universities may sponsor the name of one student from each institution, supported by the candidate's bio-data, details starting from high school onwards, including date of birth and post-graduate performance to date **(six copies)**.

The envelope containing the nomination should be superscribed **"Nomination for Best Student Award 1997.**

Young Scientist Award

This award is aimed at stimulating distinguished scientific and technological research in the field of Food Science and Technology amongst young scientists in their early life.

The guidelines for the award are :

(i) The candidate should be an Indian national, below the age of 35 years on 31st December 1997, working in the area of Food Science and Technology.

(ii) The candidate should furnish evidence of either.

(a) Original scientific research of high quality, primarily by way of published research papers and (especially if the papers are under joint authorship) the candidate's own contribution to the work.

OR

(b) Technological contributions of a high order, as reflected by accomplishments in process design etc., substantiated with documentary evidence.

The application along with details of contributions and bio-data **(six copies)** may be sent by registered post with the envelope superscribed **"Nomination for Young Scientist Award 1997.**

Best Paper Award and Best Feature Article Award

These awards are to be given by the AFST(I) Educational and Publication Trust to the author(s), who have contributed the **best paper** to the *Journal of Food Science and Technology* and **best feature article** to *Indian Food Industry* published in 1997. **A panel of experts, constituted by the Central Executive Committee, will scrutinize the issues and select the best paper/feature article for the award.**

Rajesh S. Matche
Hon. Executive Secretary

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